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American Journal of Progressive Therapeutics

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The Archives of Electrology and Radiology

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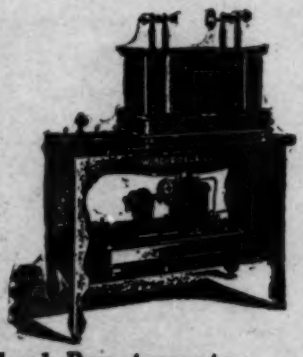

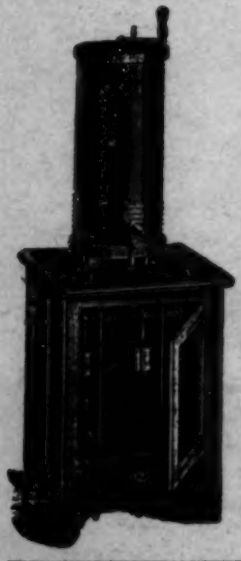

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The American Journal of
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Published Monthly by The American Progressive Publishing Co.

H. PRESTON PRATT, M. D., Editor. **A. W. SMITH, M. D., Associate Editor.**

The official organ of the American Progressive Therapeutic Society, The Illinois Progressive Therapeutic Society and The Chicago Progressive Therapeutic Society.

The American Journal of Progressive Therapeutics is devoted to E'ectrical Science, X-Ray Photography, Electro-Therapy, Radio-Therapy, Photo-Therapy, Thermo-Therapy, Hydro-Therapy, Animal-Therapy and Psycho-Therapy. In fact, every new therapy of value will find place in its columns. Medical, Dental and Surgical application of Electricity and allied forces.

It is the aim of this Journal to supplement this work by giving information in departments other than drug-therapy, and to offer a forum in which new views and new methods may receive a fair hearing and impartial criticism.

Original articles will appear in the Journal from time to time from the ablest writers in the world on these and other allied subjects of special interest to the medical profession. Comp'ete abstracts and reviews will be made of important articles published in the leading medical and scientific publications of the world.

Contributions of original articles along these lines are solicited from parties engaged in scientific researh, and if not published the article will be returned to the writer if return postage is enclosed.

This Journal is the leading scientific publication in this country along the lines of Progressive Therapeutics. It will be enlarged and greatly improved this year, and it will be our aim to assist the general practitioner by reviews of valuable articles found in "up-to-date" medical literature, and the hospitals and colleges by publishing reports of important clinical cases. You cannot very well afford to be without it.

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J. MOUNT BLEYER, M. D., F. R. A., M. S., LL. D.

SECOND VICE-PRESIDENT OF THE AMERICAN
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The American Journal of Progressive Therapeutics

Vol. XVII. DOWNERS GROVE, ILL., OCTOBER, 1905 No. 2.

THE PRINCIPLES OF PHOTOGRAPHY FOR X RAY WORKERS

BY VERNON J. WILLEY, A. M.
Director of the University Hospital X Ray Laboratory
University of Michigan

The correct technique employed in producing good negatives by the x ray process differs sufficiently from that used in the production of good landscape or portrait negatives to be worthy of special consideration.

To begin with, the radiographer works with transmitted radiant energy, while the photographer works with reflected light. The exposure of the x ray plate is therefore comparable rather to the process used in microphotography, and in fact the production of good negatives by the x ray process stimulates that technique employed in producing good micro-photographic negatives.

Landscape and portrait photographers endeavor to produce soft and harmonious gradations of shades and shadows. Dead-sharpness, microscopic definition and strong contrasts are to be avoided. The microphotographer and radiographer aim to get just these elements in their negatives.

Tho the process is quite simple, the abundance of poor negatives regularly produced is convincing proof that the process is more than mechanical.

The x ray operator is therefore urged to develop his own plates, or if he elects to do otherwise, at least to do so until he becomes familiar with the process. As the best way to secure such mastery, he is urged to adopt one brand of plates, pure chemicals and one developing formula. Variations from a good formula are permissible only after a considerable degree of familiarity with that one is attained.

The whole principle of photography is dependent upon the action of light on certain salts, particularly on bromide of silver. The plate, or film used, being coated with a gelatine-bromide of silver emulsion. The action of light renders the bromide of silver reducible to finely metallic silver by certain reducing agents, termed developers. This reduction takes place in direct proportion to the intensity of the light, particularly actinic light. We may include with actinic light, ultra-violet light, Roentgen rays, radium rays, etc.

The unreduced and unexposed silver bromide must be dissolved out of the film after development, which process is termed "fixing" the negative. The resultant negative will be quite dark

in those portions receiving the most light, and nearly transparent where it has received the least.

The experienced photographer knows that a plate receiving a relatively short exposure will give a negative having harsh and violent contrasts, especially if it be developed long enough to give good detail in the shadows. If the plate be much under-exposed, there will be very little or no detail in the shadows, and the middle tones will be sharp and harsh.

If the photographer is aiming at softness, detail, gradation and trying to avoid violent contrasts, he will call that exposure correct which gives him such a negative. Such a negative would, however, be an over-exposure, to the photographer aiming at sharp and emphatic contrasts. A longer exposure will give a very thin, flat negative, devoid of sharp contrasts. In this case prolonged development increases the density, but increases the contrast but little if any.

These points with reference to exposure must be kept in mind by the radiographer:

1. Short exposures give violent contrasts, harshness, great density in the parts receiving the most light; there may also be a lack of detail in the deepest shadows.

2. Correct exposure gives the photographer, or radiographer, contrast, good gradation, definition—in other words, that exposure is correct which yields the desired negative, and an exposure for a contrasty negative differs considerably in duration from one where softness is desired.

3. Over-exposure gives lack of contrast, lack of density, flatness, thinness, or nearly uniform darkness, or density, according to the duration of development.

Both over-exposure and under-exposure may be compensated for in a measure by modified development, provided the operator is aware of the error in exposure before he begins development.

The lighting plays an important part. Harsh, contrasty lighting may produce exactly the same kind of a negative as under-exposure. Uniform, or "flat" lighting may, on the other hand, give one a negative similar to an over-exposed plate. The lighting produced by the x ray is usually devoid of brilliant contrasts, especially from tubes which give the best results fluoroscopically.

Medium tubes and hard tubes, so called, or tubes of relatively high resistance give on the fluorescent screen what would be termed a flat lighting; a lighting lacking in brilliant contrasts, lacking in marked gradations, and hence to be corrected, if the radiographer desires *contrast, definition,* and *density,* by *avoiding* over-exposure, and by development in a clear-working, contrast-producing developer.

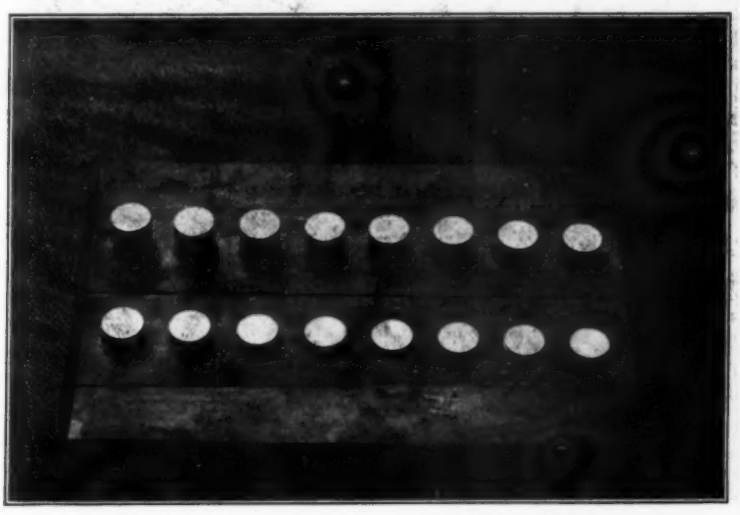
As the photographer corrects the lighting of the studio for the work at hand, so the radiographer may govern his, within certain limits, bearing in mind, however, that this will not do all. Increasing the distance of anode from plate or screen may improve the contrasts, and too much series spark gap may detract from the contrast. The anode, for medium or hard tubes, would better be about sixteen inches from the part to be radiographed, and even more, in radiographing a very thick subject, or somewhat less for a very thin one. So far as contrasts are concerned, the soft tube may be placed nearer the body than the hard one. The duration of exposure must be correct, and the handling of the plate in the dark room must be correct, to make even a correct lighting yield an ideal

negative. Yet slight errors in any one of these factors may be compensated for by suitably governing the other two.

The operator must be familiar with his apparatus; he must be able, especially, to interpret the working of his tubes. He ought, therefore, to possess some form of penetrometer, for measuring the penetration of the rays. He should also be able to judge of their volume, and should bear in mind that if his tube is properly transforming electrical energy into radiant energy, the volume of rays, or intensity of x light, will be proportional to the current going through the tube. If he is using a static machine to excite his tube, while he may produce good negatives, the exposure must be much longer than when using a coil. For quick work a coil giving a heavy output is essential.

A penetrometer, answering the purpose very well, may be made by cutting cylinders from an aluminum rod, about one centimeter in diameter, and ranging in thickness from one to sixteen millimeters. These cylinders are to be set in circular openings cut in lead, the first eight in a strip of lead one-half millimeter thick, and the second eight from nine to sixteen millimeters in thickness, set in openings in lead one millimeter thick.

This device may be fastened to a thin board, or heavy pasteboard, by means of LePage's glue. It is well, also, to fasten a strip of brass one-half millimeter thick alongside of the lead of this thickness and a strip of brass one millimeter thick beside the lead of that thickness. This instrument may be temporarily fastened in front of a small hand fluoroscope. If the hand holding the fluorscope is protected from the rays by a shield, so much the better. The operator can, with this instrument, "read" his tubes without fluoroscoping his own hand. The Benoist and the Walter penetrometers are very useful in this connection, but the simple home-made penetrometer, costing one-tenth as much, will answer every purpose.

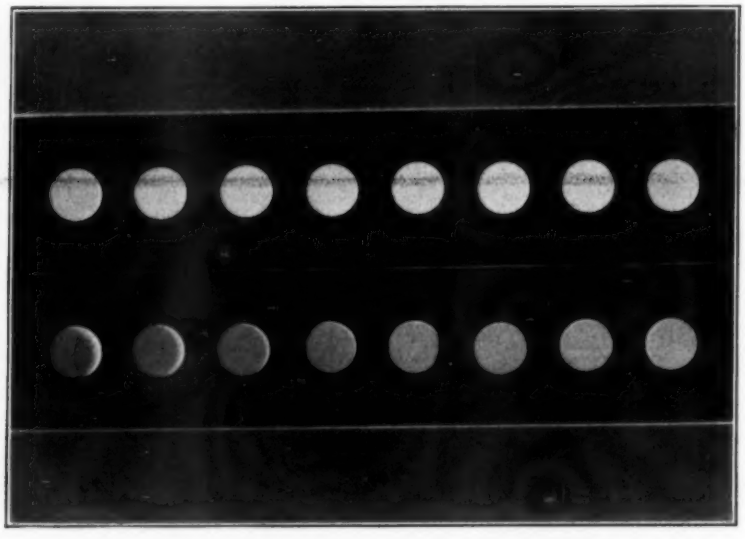


PHOTOGRAPH OF ALUMINUM WINDOW PENETROMETER

Tubes, whose rays penetrate from eight to twelve millimeters of aluminum, may be termed "soft." Negatives made from an exposure to the rays of such a tube will be brilliant and contrasty, if properly timed and properly developed. Plates so exposed will bear a larger percentage of overexposure than from the rays of a harder tube.

Tubes whose rays penetrate from ten to sixteen millimeters of aluminum, the last few cylinders but slightly, may be termed medium tubes, and these rays should also penetrate the one-half millimeter brass strip to some extent. An underexcited medium tube, or even a hard tube so excited, may give the same reading, and require nearly the same duration of exposure as the properly excited soft tube. The soft tube passes more current, and hence produces a larger volume of rays than the harder tube. Medium and hard tubes are liable to be under-excited if actuated by the current from a static machine, or small coil with mechanical interrupter.

Tubes whose rays penetrate freely the sixteen millimeters of aluminum, both brass strips and the one-half millimeter of lead are hard tubes, or else medium tubes excited by a large current. The operator will soon learn to judge by the brilliance of fluorescence under these aluminum windows, and under the one-half millimeter brass strips, of the volume of rays emitted from his tube. When reading a tube the radiographer will hold his fluoroscopic screen and penetrometer the same distance from the anode that he is to place his plate.



RADIOGRAPH OF ALUMINUM WINDOW PENETROMETER

Great care is necessary in using hard or vigorously excited medium tubes to secure proper exposure. In this case the plate will not bear very much overexposure and still yield a contrasty negative.

For quick work, great range of densities and detail in the shadows, I make use of a tube which will penetrate all sixteen windows, give brilliant fluorescence under at least the first row of eight, and also under the one-half millimeter of brass. The accompany-

ing radiograph shows the penetrometer exposed to such a tube twenty seconds at a distance of twenty inches from the anode, a mercury jet interrupter and an eighteen inch spark gap induction coil being used. The tube backed up about eight inches parallel spark gap. The electrolytic break is more satisfactory for rapid work, as the output from the secondary is very much greater, and the number of interruptions greater. The tube receives more electrical energy, and good chest skiagraphs can be made in from one to six seconds with such a tube, whose reading is exhibited, backing up not more than eight inches parallel spark gap. Any part of the body can be radiographed in forty-five seconds Any good tube, with heavy anode, and preferably at least six inches in diameter, will do this work. The tube must, of course, be able to maintain its vacuum during the exposure, and work continuously without "flashing."

I use a softer, or less penetrating tube, with the mercury jet interrupter, and spark gaps in series in all cases sufficient to cut out inverse discharges from the coil, or to make the tube work clearly, without irregular fluorescing of the inactive hemisphere, for radiographing thin structures, or getting bony detail in hand, foot, wrist or elbow. The exposure for these parts is sometimes as long as forty-five seconds with the so-called soft tube. Fluoroscopic examination of the parts so radiographed show the bones quite dark, yet penetrated slightly. In all his work, the radiographer will succeed better if, under proper protection to himself, he fluoroscopes the part to be radiographed, and selects that tube which, while the rays penetrate freely, gives the greatest contrast in lighting. In other words, *the softest tube that will do the work is the one to be selected.*

It is poor economy and worse practice to try to make one tube do everything. Keep your new tubes on hand for light work. As they become seasoned by use, they wil bear a heavy current, and may be used for quick work without their falling in vacuum and penetrating power during the exposure.

Every radiographer should have a good dark room. It should be equipped with running water, be well ventilated, and, if possible, should be equipped with double doors, with spaces between, allowing one to pass out, closing the first door behind him before opening the second. This permits ingress or egress without admitting light. The dark room should have plenty of shelving, and everything should be kept clean and in order. It is important to have different trays for developing and fixing. Large granite pans will answer very well for the fixing bath. Here cleanliness is absolutely essential to success. The dullest ruby light that one can get along with is none too safe.

On the choice of a developer depends a great deal of the radiographer's success. I believe he will do well to avoid the rapid working developers, which, while they give detail and softness, do not give that brilliancy, contrast and density desired in an x ray negative. The developers which do give these qualities to the negative are hydroquinone, adurol, glycin and pyrol. The first three may, of course, be compounded to advantage with some of the rapid, soft, detail giving developers, such as edinol, metol or ortol.

Developers are easily adjusted in composition to meet the requirements of different conditions, and the worker should understand the composition of his developer in order that he may use it intelligently.

The necessary constituents of a developer are usually five, as follows:

First, the reducer. The developing agent itself, hydroquinone, adurol, glycin, edinol or ortol is termed a reducer because it is really a reducing agent. Its function is to combine with the bromine from the bromide of silver, which has been acted upon by light, or Roentgen rays, and set free finely divided silver in the film. It is the reducer which brings out the image on the plate, invisible before development.

Second, the accelerator. The addition of an alkali hastens or accelerates the action of the reducer by increasing its affinity for bromine, or oxygen. After the reducer has been combined with the accelerator, in solution, it rapidly oxidizes on exposure to air. and hence should not be exposed to air except during development. The rapidity of development is governed by the amount of alkali. Too much alkali will cause fog, or haziness, especially if no restrainer be used, and too little will make the developer work too slowly and with lack of detail. The carbonates of sodium and potassium are usually chosen as accelerators.

Third, the preservative. This is a chemical which protects the developer from rapid oxidation on exposure to air, and governs the color of the deposit in the film. Oxidized developers stain the film a yellowish brown. Sodium sulphite is usually used. It is also a reducing agent, and is sometimes called the "stain preservative," as the quantity used governs the color of the silver and gelatine film. Too little leaves the negative stained brownish yellow and too much gives a bluish or "cold" tone to the negative. A little more can be used with profit in x ray developers than in portrait or landscape negatives, where "warm" or brownish black negatives yield stronger prints. Metabisulphite of potassium is also used. Acetone sulphate is also an excellent preservative, and also acts as a restrainer, imparting clearness and brilliancy to the negatives, besides saving some detail in the dense parts of the negative, by preventing these parts from "blocking up."

Pyro and hydroquinone usually require some additional preservative, such as a few drops of sulphuric acid, or a few c.c. of saturated solution of oxalic or citric acids.

Fourth, the restrainer. This is a chemical which retards the too rapid action of the developer on the middle tones and shadows. A restrainer causes the developer to work with clearness, crispness, contrast and brilliancy. It works to prevent fog. It is not usually essential in portrait or landscape photography, but its use in x ray developers is quite essential, as its presence insures more marked contrasts between tissues of slightly different densities. Potassium bromide is the restrainer usually used, and its action is to furnish bromine for the developer to act upon, leaving the bromine of the least exposed bromide of silver to be acted upon most slowly.

Fifth, the solvent. This last constituent, water, is a very important one. Much trouble may arise from the use of water containing either organic compounds or iron from the water pipes. The water used for the developing solution should be distilled water, if obtainable, if not, water from melted ice, or boiled water, either of which should be filtered if not perfectly clear.

The developer should be compounded only of the purest chemicals, dissolved in order. It should be stored in bottles holding not more than 500 c.c., kept well filled and closely stoppered to prevent oxidation. It is also well to make up the developing solution and the alkaline solution sep-

arately, and combine them just before use. The use of a hydrometer in making up the alkaline solution, and even the sulphite of soda solution, is to be recommended on account of its accuracy.

After much experimenting, I have adopted the following developer for all my work, on account of its giving uniformly excellent results:

300	c.c.	Water	10 oz.
10	grams	Acetone sulphite-Bayer..	150 grains
30	„	Sodium sulphite (c. p. desiccated)	1 oz.
4	„	Edinol	60 grains
2	„	Hydroquinone	30 „
60	„	Potassium carbonate (c. p. desiccated)	2 oz.
1½	„	Potassium bromide	20 grains

Dilute each part with from four to six of pure water before using. The used developer may be preserved in well-stoppered bottles and used for the development of plates exposed under thin parts of the body. Some of the old developer, which is still clear, may be added to the new if increased clearness and contrast are desired.

More hydroquinone and less edinol gives greater contrast, say three grams of each in the above formula give good contrasts.

The potassium carbonate solution may be made up sixty hydrometer test and two parts of this solution added to one part of the developer, then two to three parts of water added.

The use of a drop of ten per cent. solution of potassium bromide in case of over-exposure, or too quick an appearance of the image, will save many negatives.

The temperature of the developer should be as nearly as possible to 68 or 70 degrees. Lower temperature means slower development, less detail and added contrast. Higher temperature, quicker development, less contrast, frilling of the gelatine film.

The fixing bath is a very important compound. I have not found anything superior to the chrome alum acid fixing bath. It keeps well, and may be used repeatedly, but as soon as it becomes slow in action it should be discarded. the containing vessels rinsed thoroughly and a new bath made up. The formula is as follows:

A.

Hyposulphite of soda solution, 80 Hydrometer test, 5,000 c.c.

Sulphite soda solution, 60 hydrometer test, 800 c.c.

The hypo solution may be made up in a crock, the sulphite solution added, and while stirring rapidly add the following:

B.

Chrome alum solution, test 20, 1,600 c.c.

Sulphuric acid, c.p., 40 c.c.

Plates should be left in this bath double the time necessary for the whiteness of the film to disappear. If they are thoroly fixed, thirty minutes' washing in running water will suffice.

The exposed plate should be removed to the dark room and developed as soon as possible after exposure. It is well to develope the plate before the patient is allowed to leave the laboratory, as any poor results can then be rectified by additional exposures without the necessity of calling the patient back. The developer should be prepared in a graduate, or glass pitcher, and the room darkened, save for the ruby light. Remove the plate from the envelope, and place it, film up, in a freshly washed tray. Tilt the tray slightly and flow the developer over the plate with one sweep, to avoid adherent air bells, and at once begin rocking the tray slowly and evenly. Have a watch near enough the ruby light so you can keep track of the time, or, better still, use a metronome beating seconds. Keep the tray well removed from the ruby light, especially

during the first part of the development. Note carefully the time of appearance of the image, *i. e.*, the clear outline of the object radiographed. The image ought to appear in from forty to eighty seconds—not so soon as the appearance of the image in a portrait or landscape negative. If the image appears before forty seconds, using the formula given, there is great danger of fogging. The most of my plates are so exposed that the image appears in one minute, and development is completed in from six to eight minutes. Whatever the time of the appearance of the image, development will be completed in from six to eight times the time of appearance of the image.

The development of a plate a definite multiple of the time of appearance of the image is termed *factoral development* and is based on the principle that for a given developing solution, the reduction of bromide of silver proceeds at a definite rate. Different developers have different factors, but the factor for any one developer is a constant for the same density, if the exposure be near enough correct to give even a fair negative. The factoral method of development was perfected by Alfred Watkins, and is advocated by all photographers, who despise rule of thumb methods. Its use enables even the beginner to produce uniformly developed negatives. Just what factor to use, the operator will decide for himself, in accordance with the density he desires. Having determined that, he is ready to duplicate his results. Factoral development has the added advantage that the ruby light may be dispensed with, as soon as the time of appearance of the image is determined. Many plates are fogged by holding them up to the ruby light for examination during development. It is well to avoid this altogether, for better and more uniform negatives can be secured by the factor method.

If the tissues begin to develop out in less than one minute, with the formula mentioned, the plate should be removed to a tray of running water and more bromide solution added to the developer, say three drops of the ten per cent. solution to each ounce of developer. Then return the plate to the developer and complete the development. Plates suspected to be over-exposed may be developed in a developer made up of half old and half new solution. Care is necessary, however, in using old developer, as that which has become much discolored may stain the film.

The plate should be subjected to about two minutes' washing between development and fixing, and after fixing, and it has been washed the required time, it should be wiped off on the film side with a wisp of wet absorbent cotton and flushed off for a minute under the tap, to remove any sediment from the wash water. Negatives should dry in one hour or less, preferably in a light draft of dust-free air. Too slow drying adds density to the negative and robs it of some of its brilliancy.

In conclusion, the radiographer should keep in mind, first, that the shortest possible exposure consistent with detail in the shadows will give the greatest contrast between tissues of different densities. The greater the penetration, the harder the tube, the higher its vacuum, or the greater its resistance, and the greater the current strength through such a tube, the greater is the liability of over-exposure. Furthermore, the tissues themselves, when actually rayed, undoubtedly become secondary centers for radiant energy which will fog the plate in a slight over-exposure.

Second, the softest tube, or tube of lowest resistance, whose rays will

freely penetrate the tissues of the part to be radiographed, and which will maintain its vacuum during the exposure, is the tube whose rays will produce a negative presenting the greatest contrasts between tissues differing but little in density.

Third, a clear-working, contrast-producing, detail-giving developer is essential, especially where high voltage and large amperage have been used with a medium, or hard, tube, as would be the case where the patient holds the breath during the exposure of chest or abdomen.

The radiographer should learn to govern not only these different factors for the work at hand, but also to modify the duration of exposure and development to adapt them to the quality and quantity of Roentgen rays produced by his tubes.

A great deal of experience is required to produce the expert, but the novice may produce acceptable work in a few months' time by careful attention to details.

UNIVERSITY HOSPITAL X RAY LABORATORY.

ON THE IMPORTANCE OF DIFFERENTIATION IN THE USE OF ELECTRIC MODALITIES*

BY A. D. ROCKWELL, A. M., M. D.
New York

The term electricity is in a way generic and includes a wide variety of manifestations. In atmospheric electricity we see in highest degree these varied manifestations, magnitude, voltage, with infinite rapidity of oscillation, and the combination is simply deadly in its effects. Man has, in a measure, triumphed over this lethal energy, has analyzed and dissected it, as it were, and made it subservient to his uses, both commercially and therapeutically. In therapeutics we utilize it in the form of the continuous current, one manifestation of which is represented by what is commonly termed the galvanic current with its magnitude and low voltage, the other by the faradic current representing a far higher voltage with negligible magnitude.

Static electricity represents a still higher voltage with practically no magnitude, while high frequency currents are still other manifestations of electric force, with electromagnetic induction effects, kindred to those from the primary circuit of an induction coil, but widely differing in the degree of their physical, physiological and therapeutic effects. The principles of the ordinary induction coil are here all carried out, the jars taking the place of the cells, with a spark gap instead of a rheotome or current breaker. Like the ordinary faradic current, high frequency currents require for their development some form of initial electric force transmitted through the medium of condensers, coils of wire of varying thickness and length, and like the ordinary faradic current, the relationships of magnitude and tension depend altogether upon the character of the initial force and the intermediate coils of induction. In the same way, therefore, as the faradic current can be made to differ widely in its effects—according to the character of its coils—so, too, with high fre-

* Read before the American Electro-Therapeutic Association, September, 1905.

quency currents. It is the degree of the step-up process through which high frequency currents are obtained that determines their efficiency, and as there seems to be no uniform constructive standard among manufacturers it is difficult, if not impossible, for different workers to compare results with absolute accuracy.

Now, if there is any one thing more than another that has retarded, still retards and will continue to retard the all-round and scientific development of electricity in medicine, it is the increasing tendency to neglect the subject of differentiation in the selection of the various electric modalities. Neglect is but another name for ignorance of the subject neglected, and ignorance leads not only to unsatisfactory therapeutic results, but in the case of so potent an agent as electricity, to damaging results that may be more than transient. I venture to say that the majority of physicians who are doing electrotherapeutic work today, whether as a side issue in general practice, or as in some sense specialists along this line, have failed to take a broad and comprehensive survey of the field upon which they have entered, and would be unable to define the principles which underlie the therapeutic uses of this agent.

The individual experiences suggesting these reflections have been many and frequent, and one of the more recent of which I beg leave to offer as my text:

A physician who had made much use of electricity consulted me some time ago as to its use in a case of pelvic pain. I suggested the high tension current by the bipolar method. He attempted the treatment but succeeded only in inducing in his patient, a delicate, nervous young woman, a most violent tonic muscular contraction. The result was hysteria, increase of pain, and a general nervous breakdown, from which the victim has by no means yet recovered. In addition, the doctor was threatened with legal proceedings, which have been prevented only by much tact, aided by some substantial pecuniary consideration.

In this case the trouble was caused through ignorance of the relation of quantity of volume, and tension, and the measure of their combined or respective influence on living tissue, together with unfamiliarity with the mechanism of the apparatus employed. It was desirable to produce a sedative effect through the use of the high-tension coil. To secure this effect and avoid injury in the application of the varied manifestation of inductive energy, one must appreciate the fact that, thru high resistances, such as the skin, the high tension current exerts a vigorous action, while an induction current of low tension through the high resistance of the skin, acts much less vigorously. On the other hand, when applied thru the low resistance of a mucous membrane, the high tension current acts with little vigor so far as muscular contractions are concerned. Its efforts are gentle, sedative and barely perceptible.

On the contrary, the induction current of low tension and increased magnitude acts as powerfully thru the low resistance of the mucous membrane as do high tension currents thru the high resistance of external surfaces, but producing effects that are irritating and decidedly painful.

A little personal experimentation will readily convince one of the striking difference in the action on nerve and muscle of these varying combinations of magnitude and tension. It is very easy accidentally to demonstrate this principle to the injury of the patient and the astonishment and chagrin of the physician. This is what may very readily occur, and what act-

ually did occur in the case above recorded. A bipolar application with the current of tension is being made to some one of the mucous surfaces. The patient complains of an uncomfortable sensation which may or may not be due to the action of the current, and the slide is shifted so as to exchange the current of great tension but negligible magnitude, for one of lesser tension but appreciable magnitude, which, according to all the experiences of external application, is infinitely weaker. Instantly a shock is occasioned, associated with the acutest pain and rigid contractions, that astonishes the operator and terrifies the patient. In all this reference is made to that much neglected, but eminently useful, modality commonly termed the faradic current, the physiologic and therapeutic action of which varies within its range of power in the same way as do high frequency currents. In the use of the latter, I have had frequent occasion to differentiate between its various manifestations, and have seen illustrated in a very positive manner their relative therapeutic as well as physical effects. It will be conceded that nutritional effects in greater or less degree attend the use of every electric modality; it is indeed this fundamental idea of its nutritional effects upon which in great measure must be based its utility in medicine. That it works both ways—that alternating currents of high voltage may disturb as well as improve the processes of nutrition, has been recently observed among the employes in great power houses, where, exposed for long periods of time to such influences, grave functional disturbances of nutrition are not infrequent. My own use of high frequency currents has been mostly wth static electricity as the initial force, connected with the ordinary condensers, and for the primary and secondary coils, wires respectively 25 and 200 feet in length. It seems to me, after a considerable experience, that with this arrangement we get the two extremes of high frequency effects that will accomplish about all that can be expected from more elaborate combinations. The current from the secondary coil with tension and enormous frequency but without magnitude, yields, as one would naturally infer, results that are quite superficial; valuable for their effects upon the periphery, but much less efficient so far as constitutional or deep-seated nutritional effects are concerned.

The current from the primary coil with lower tension and frequency, but with far greater magnitude, not only influences the periphery and superficial skin lesions, but exercises a distinctly deep-seated nutritional effect. An interesting confirmation of this fact was recently observed in a case of pseudo-hypertrophic muscular paralysis. Now, muscular paralysis of this type is admittedly an incurable disease. During the course of my experience a number of such cases have been subjected to a thoro course of electrical treatment, including continuous and static methods, but never with the slightest benefit. The developmental tendency to tissue growth, which is its essential element, has thus far baffled every effort. While, like locomotor ataxia, this disease is progressive, there is often seen, as in the latter condition, periods of retardation and apparent arrest, so that certain drugs, such as arsenic and phosphorus, have been supposed to exert a distinct influence in temporarily, at least, arresting the progress of tissue growth, but thus far there has been no satisfactory proof that this arrest is anything more than a part of the natural course of the disease. What has interested me in two cases that have come under my observation, was not simply an apparent arrest, but a very positive improvement

under the influence of high frequency currents of magnitude, administered, not by the indirect method of D'Arsonvel, or the method of autoconduction as it has been termed, but by the administration of the spark itself by the direct bipolar method. This improvement manifested itself in three pronounced ways: First, by the ability of the patient to get in and out of a street car without assistance, something that she had been unable to do before in the progress of the disease, for the past six months; second, in the ability to walk unaided without frequently falling; third, in such an increase of power over the waist muscles as to enable her, when bending far over, to raise her body to the erect position without the aid of her hands.

Further progress has not been and in all probability will not be attained, and the progress of the disease will not be permanently checked, but the case illustrates in a very interesting way the superiority of a magnitude over pure tension and frequency in influencing the nutritive processes, and is but another illustration of the importance of differentiation.

The rationale of the superiority of currents of magnitude in not only ameliorating the symptoms of many organic conditions, but aiding in the cure of deep-seated congestive conditions, may be explained by its superior vasomotor influence with relief of blood pressure, improvement in nutrition of degenerated nerve cells and consequent development of potential energy.

The superiority of the continuous current of magnitude (galvanic current) over all other manifestations of electricity for the relief of inflammatory exudates, is, or ought to be, too well known to need any emphasis of mine. And yet it is not uncommon to find physicians using other forms of electricity and especially high frequency currents, in the belief that they were utilizing the best methods; forgetting that the rationale of the action of electricity upon all inflammatory exudates is based upon chemico-physical action, and that in the continuous current of magnitude alone do we get appropriate and satisfactory electrolytic and absorptive effects. In discussing the admittedly difficult subject of differentiation, there is one combination of electric forces that deserves consideration. I refer to combined electrization or the transmission to the body through the same electrodes of the direct and to and fro currents (the galvanic and faradic). To determine its distinctive value is certainly more difficult than to differentiate between the individual modalities of electricity. It is very much a question of practical experience aided in some degree by our knowledge of the physical and physiological action of the various modalities. Each of them possesses a certain limited power to relieve pain, one succeeding where another fails, and the reason for success or failure can often be accounted for through misapplication—the application of stimulating effects where sedative effects are called for and *vice versa*. Combined electrization is not efficient for the relief of pain in any such degree as the various single manifestations of electricity. On the contrary, it is more likely to increase than to decrease any form of pain, simply because its combined mechanical and chemical or electrolytic action is bound to act counter to the effect desired, whether it be sedative or stimulating. On the other hand, its musculosedative effects are pronounced, rendering it distinctly more valuable in the relief of spasmodic conditions than any single modality. The superior effects of galvanofaradization in the treatment of constipation and

enterocolitis, which I have often observed, and which have been emphasized by some others, notably by Bordier and Delherm, I am inclined to attribute to this control of muscular spasm which is believed to be a not infrequent accompaniment of intestinal atony.

THE CURE OF CARCINOMA BY MEANS OF THE X RAYS*

BY DR. HEINZ WOHLGEMUTH
Berlin, Germany

While there is very little doubt at the present day concerning the fact that superficial cancroids of the skin can be cured by the use of the x rays, we have, on the other hand, to record a marked dissention of opinion regarding the curative effect of these rays upon deep-seated cancers. If we take the carcinoma of the mamma as an example, we find reports of cases positively cured by Skinner, Perthes, Daniel, W. J. Morton, Barney and others. In marked contrast with the experience of these authors, Lassar asserted here today that the Roentgen rays exert a distinct effect only to a depth of one-half of a centimeter, so that an ulcerated deep cancer may apparently heal on its surface, while, however, the rest of the tumor preserves its malignant character. It would seem that Lassar's view is confirmed by the microscopic sections demonstrated here by Unger. I beg, however, to dissent. The one specimen of Unger is taken from a cancer of the breast which has been x rayed ten times. It is true that only to the depth of five millimeters the characteristic cancerous growth had disappeared and was transformed into typical scar tissue. But nothing more could be expected from only ten treatments. Unger failed to state how long each radiation lasted, what tube he used, whether hard or soft, at what distance the tube was held from the growth, and a few other points which are of paramount importance in the consideration of the general qualification of x rays in the treatment of malignant new growths.

It is my belief that actual demonstrations are more likely than theoretical argumentations to bring us nearer to the satisfactory solution of this important question, and I, therefore, take pleasure in presenting to you a patient who demonstrates beyond the possibility of doubt the fact that x rays do have a pronounced curative effect upon carcinoma of the breast to the depth of three to four centimeters.

The patient is seventy-six years old. Seven years ago she first observed a nodule in her left breast, which within the next four years gradually increased to the size of a hen's egg. At that time it had reached the skin and formed a suppurating sore. A surgeon advised amputation of the breast, which was refused by the patient. She applied a boric-acid-zinc-paste to the ulcer at the time when she first came under my care in November, 1904. At that time she looked decidely cachectic, complained of very acute pain in the left mamma which prevented her sleeping at night, and caused her to moan, and at times to yell out loud while she was awake. Just above the left mammilla a tumor was found about the size of an apple, hard, movable against the underlying ribs, with an ulcerated surface measuring 6.5 cm. The sore bled easily, was covered with a yellowish-green secretion,

* Paper read before the Roentgen Congress in Berlin, April, 1905.

no reddening of the surrounding tissue. In the left axilla a lymph gland could be felt, size of hazelnut.

Protecting the surrounding tissue, the tumor was exposed to the x rays three times a week, five minutes each time. A hard tube was used in a distance of 25-30 cms., motor-quicksilver current interrupter. The following observations have been recorded: Most pronounced was the immediate effect of the radiation upon the pain. It gradually became less and disappeared after four weeks. From one treatment to the next the progress of the epitheliasation could be observed, which started from the edges of the sore and advanced centripetally. The ulcus became smaller and flatter by a reduction in the size of the tumor. After fifty-two applications of the rays, sore and tumor had completely disappeared and in its place is found a soft, flat scar. The enlarged lymph gland had disappeared about two and one-half months after the beginning of the treatment.

This tumor has not disintegrated under the influence of the rays as I have seen it do in a case of cancer of the uterus; it melted away; it has been resorbed like an acute inflammatory swelling. This particular form of restitution *ad integrum,* in my belief, is due to the careful dosage of the rays, a visible reaction of the skin having always been avoided. Once when the skin became reddened and patient complained of pain, I discontinued the treatment for one week.

The condition of the breast of this patient is today an ideal one; her general condition very satisfactory. Of course, I do not make any claims for a permanent cure. Too short a time has elapsed, and there is still a small gland above the left clavicle, which I shall remove for microscopical examination. I wish to repeat that I have presented this paper simply for the purpose of demonstrating that the x rays can be used successfully even for deep-seated cancers if the proper technic is applied.

No answer can be given to the question as to how the rays affect the carcinoma, whether they inhibit the growth of epithelial cells or destroy them, or under proper dosage are capable of rendering the normal stroma cells more effective in combating the malignant growth. Of course, if the radiation is pushed until the tissue becomes necrotic, and the surrounding skin shows the reactive reddening, the *modus operandi* is clear. Several observations seem to indicate that cancerous tissue shows less resistance towards the influence of Roentgen rays than normal tissue, so that the latter will exhibit but a slight reddening, while the former is thrown off in large necrotic pieces. This effect can, however, be obviated, if, as I have done in this case, the rays are not permitted to produce any noticeable irritation. It seems reasonable to assume that this mode of procedure lends valuable assistance to the leucocytes in their action of defense.

The return of the enlarged gland to its normal size is not so remarkable; this phenomenon has been repeatedly described. Of course, I am not in a position to offer you any proof whether the enlargement was due to a carcinomatous or a simple inflammatory infiltration.

EDITORIAL

The American Progressive Therapeutic Society.

All persons who wish to read papers before the American Progressive Therapeutic Society, which will be held at Chicago in December next, will please send their names to the Secretary, Dr. Joseph R. Hawley, Stewart Bldg., Chicago.

American Electro-Therapeutic Association.

The fifteenth annual meeting of the American Electro-Therapeutic Association was held at the Academy of Medicine, New York City, on September 19th and 21st. Medical men from all parts of the United States attended in large numbers, and some very interesting papers were read, showing that a very considerable advance had been made with the use of the various forms of electricity in its application for the prevention and cure of disease.

Dr. William James Morton, of New York, read a paper on the "Preparation of Radio-Active Water," in which he pointed out the simplicity of obtaining it by merely placing ten pounds of pitch-blende in about two gallons of water; after two weeks the water was strongly radio-active, and his experience proved its therapeutic value. Dr. G. Betton Massey, Philadelphia, on "Methods in the Treatment of Operable Cases of Cancer," proved that electricity could be used with more advantage than was generally supposed. For the early stages he recommended mercuric cataphoresis, for advanced stages the knife, and for cancers difficult of access the x rays. Dr. Amédée Granger, New Orleans, in a long paper on "Clinical and Experimental Study of the Action of Mercuric Cataphoresis in the Treatment of Cancer," gave his experience in using currents varying from 200 to 700 milliamperes—the treatment lasting in some cases an hour and forty minutes. Dr. E. C. Titus on "The Action of Roentgen Rays and Light Upon the Enzymes" showed from his experiments on vegetable seeds, hens' eggs, etc., the therapeutic action of the rays in certain diseases and the great value of sunlight. Some thirty other papers all went to show that the use of electricity with regard to the more serious diseases was daily gaining ground.

American Roentgen Ray Society.

The sixth annual meeting, held in Baltimore, Md., September 28, 29 and 30, 1905, was called to order by the president, Charles Lester Leonard, M. D., of Philadelphia. The following papers were read and discussed:

Study of Stomach and Intestines.—Dr. Henry Hulst, of Grand Rapids, Mich., spoke of the value of the Roentgen ray in the diagnosis of diseases of the stomach and intestines, especially in dilatation and dislocation of the stomach. These organs may be inflated, but inflation is often painful, dangerous and inadequate. The best method is to give one ounce of bismuth in a pint of milk, or bread and milk, or potato soup. Then two exposures are made, one in the erect and one in the recumbent posture. If the first radiograph was made at noon, a second is taken at six, nothing having been taken into the stomach in the meantime. Thus, it is possible to ascertain the size, position and functional capacity of the stomach. If a good picture of the colon is not obtained in this way, three

ounces of bismuth may be injected per rectum. It is essentjal to have the patient at rest. There must be no breathing, and as little peristalsis as possible. If the subject is very fat, it may be necessary to intensify the screen. This is not particularly objectionable with a sixteen-inch coil, a Wehnelt interrupter and a strong tube placed twenty inches from the skin surface. A plate can easily be made under these circumstances in a medium-sized subject in one second; without the intensifying screen, in three seconds. Ordinarily he has found it better to make the exposure at twenty inches in ten seconds without intensifying screens. Good apparatus and a fair degree of skill is sufficient to secure fairly satisfactory results. The diaphragm is quite indispensable.

Skeletal Development.—Dr. P. M. Hickey, of Detroit, Mich., showed slides demonstrating the bony development of the elbow joint, and emphasized the importance of comparing the injured with the uninjured joint before attempting to make a diagnosis of fracture, because the crevices in a developing joint may easily be mistaken for fracture when it really does not exist

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Ia., said that the anatomy of joints, as given in the text-books, should be revised to agree with the Roentgen ray findings, as demonstrated by Dr. Hickey.

Dr. Henry Pancoast, of Philadelphia, said that fractures of the head of the radius are far more common than is usually supposed, although only a few cases are recorded in the literature. He has had twenty cases.

Interpretation of Lung Negatives.—Dr. George E. Pfahler, of Philadelphia, said that in order to study the lungs satisfactorily the negative must be made while these organs are at rest. A careful physical examination should precede the Roentgen examination, to enable the radiographer to make a correct interpretation of shadows. The greatest field of usefulness of the Roentgen ray in lung diseases, is in the study of tuberculosis. Besides assisting in making a diagnosis, it is a most valuable and correct method of recording the lesion at the various stages of the disease. The plate is placed behind the patient, and a second plate in front of the patient, so as to give proper value to lesions lying near the surface, and to recognize any thickening of the pleura. The patient is placed in the recumbent posture, except when a pleural effusion is suspected, when the patient is placed in the sitting posture. The tube is placed at a distance of eighteen to twenty inches from the plate. The time of exposure will vary with the time that the patient can hold his breath. This time should be determined by testing the patient several times before attempting to make an exposure.

Dr. Henry Hulst, of Grand Rapids, Mich., has found that macroscopic lesions of the lungs show very well, also old lesions, but not recent lesions. He never exposes a chest for more than one second in order to get the detail of soft tissues. When lesions are present that the Roentgen ray can record, the diagnosis is positive. A negative diagnosis is only of relative value. It does not exclude the existence of tuberculosis.

Dr. M. K. Kassabian, of Philadelphia, said that by means of stereoscopic pictures it is possible to distinguish consolidation from pleural thickening and from cavitation. It is better to take the picture with the patient lying on the side and not on the back.

Diagnosis of Aneurisms.—Dr. Frederick H. Baetjer, of Baltimore, gave the points in diagnosis between aneurism and dilatation of the aorta. A pulsating shadow which does not disappear between pulsations is always sus-

picious. By means of the Roentgen ray a diagnosis of aneurism can be made earlier than by any other method, and the treatment can be begun earlier and it can be planned more intelligently; hence the results are better. Before proceeding with the Roentgen ray examination, the patient should be examined carefully, to exclude physical deformities of the chest and spine. The patient is then placed with his back to the tube, the tube being placed at the level of the third rib, and from twenty to twenty-four inches from the skin surface. A second picture is made from in front. By means of transverse or slightly transverse illumination it is often possible to tell whether the object seen has its attachment in front or behind. This is especially important in determining whether the aneurism springs from the ascending or descending portion of the aorta. By making the examination at two different levels the composite picture is a true one.

Dr. P. M. Hickey, of Detroit, has found that the most disastrous results followed the disregard of the Roentgen ray diagnosis of aneurism. When mistaken for tumor, an operation always proves fatal.

Presidential Address.—Dr. Charles Lester Leonard, of Philadelphia, reviewed what has been accomplished with the Roentgen ray since its discovery ten years ago, discussed its application in medicine, and indulged in a speculative discussion of the identity of the ray, its chemistry and physiologic action. He said that improvement in technic and better knowledge of the action of the ray and its application will advance its usefulness.

Regulation and Measurement of Therapeutic Dosage of Roentgen Ray.—Dr. E. G. Williams, of Richmond, Va., said that the more superficial the effect desired, the closer the tube should be placed to the skin surface. He has found that about ninety minutes are required to produce an erythema on the surface, with a tube distance of ten inches, spark gap four inches, equivalent to the resistance in the secondary circuit, and the milliameter showing three-fourths of a milliampere. The safety limits are about thirty per cent. less than the number of minutes required to produce a decided erythema. The law of inverse squares helps in regulating the length of exposure and the distance of the tube from the surface. The closer the part is to the tube, the greater is the difference in the effect on the skin and the parts beneath, and inversely, the farther the part is from the part the less is the difference between the effect on the skin and the part beneath. His rule is not to expose in ten days more than the number of minutes required to produce a dermatitis. He usually gives treatments in series of four to six exposures each, in which the sum total number of minutes equals the number of minutes required to produce the desired effect. The tissue is also affected in proportion to the relative number of cells it contains. To measure and record a dose of the Roentgen ray there should be noted the duration of the exposure, the distance of the surface from the platinum disk, the equivalent spark gap and the reading of the milliameter.

Dr. M. K. Kassabian, of Philadelphia, described the means adopted by French and German Roentgenologists for determining the dosage of the Roentgen ray, such as the use of fluorescent paper and capsules containing a fluorescent substance.

Technic of Roentgen Treatment of Keloids.—Dr. O. Shepard Barnum, of Los Angeles, Cal., advised using a great abundance of rays from a tube of rather high resistance, and excited by a large coil. That means good penetration and differentiation. The tube should be at least six inches in diam-

eter, and it must have good penetration and not be lacking in definition. He uses a ray which will show the bones in the hand at twelve feet distance. He said that it is better to have the tube too high than too low. The tube distance should be from fifteen to twenty inches, with an exposure of fifteen to twenty-five minutes on alternate days for eight to ten treatments. Then rest ten days or until convinced that there is no dermatitis. Then repeat the process until the tumor has disappeared entirely. The treatment should be pushed for three to six months, and then tapered off until every vestige of the tumor has disappeared.

Present Status of Radiotherapy.—Dr. Gordon G. Burdick, of Chicago, said that there is no longer any question as to the specific field of the Roentgen ray in all forms of acne, lupus. eczema, psoriasis, pruritus, tinea, sycosis, mycosis fungoides, senile keratosis, venereal condylomata and hyperidrosis. Among the skin diseases that may be classed as erratic are lupus erythematosis, pigmented vascular nevi, hypertrichosis and acne rosacea. Of the first mentioned about 18 per cent. are cured and about 30 per cent. are improved. He has treated eighty cases of epithelioma involving the skin only, with no recurrence. When the tumor is situated at a mucocutaneous junction it is well to have the glands removed after a period of quiescence has been brought about by the x ray. He followed this method in twenty-three cases, with no recurrence after two years. He considered the Roentgen ray sufficient treatment in the great majority of cases. The knife should be used only in such cases where the tumor is situated favorably for radical removal. In cases having the characteristic odor, he invariably anesthetizes the surface, and by means of the galvanic cautery drives into the tissue for a prolonged period of time zinc and mercury ions, following with the Roentgen ray after the separation of the slough. Eighteen cases of carcinoma, treated vigorously with the Roentgen ray, were cured. In fourteen, the tumors and enlarged glands, disappeared completely; in four, they ceased growing. All primary cases should be rayed, excluding the knife. He does not believe in the existence of a case of sarcoma that cannot be markedly benefited by a prolonged, mild radiation from an old hard tube, well coated with aluminum, the thickness depending on the individual circumstances existing in the individual case.

Treatment of Carcinoma.—Dr. Geo. C. Johnston, of Pittsburg, said that in carcinoma of the breast the application of a ray of sufficient intensity, for a sufficient length of time, is capable of causing a disappearance of the tumor and carcinomatous cell nests and their replacement by connective tissue, a proliferative, obliterative endarteritis and a sclerosis of the lymph vessels and glands leading from the affected part. A course of radiation, not to exceed ten treatments of twenty minutes each, at a tube distance of eighteen inches, is sufficient in the majority of cases to accomplish the desired result. A tube of fairly low vacuum should be employed, carrying a current not to exceed two and one-half milliamperes. On about the fifteenth day after operation, postoperative treatment should be begun. Cases of extensive carcinoma may be rayed, operated, rayed again and freed from the disease, providing the surgeon and the roentgenologist co-operate thoroly. Postoperative radiation is made directly over the wound through the dressings, the length of each exposure being ten minutes; treatment being given every other day for as long as may be necessary.

Late Results in Treatment of Sarcoma.—Dr. William B. Coley, of New

York, said that facts, up to the present time, fail to show that Roentgen ray is curative of malignant growths, except those that are located superficially. No patient has yet remained free from a local or general recurrence for three years. The value of postoperative treatment is undetermined. The treatment of sarcoma by the Roentgen ray has shown, in a small proportion of cases, that the tumors decrease in size and even disappear in a few instances. In the small percentage of cases in which the tumor has disappeared, the universal tendency to recurrence and the danger of dissemination of the growth is sufficient reason for not advocating the method, except in inoperable or recurrent cases.

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Ia., believed that the use of Coley's antitoxin precipitated the occurrence of metastases. Drs. Bowen, Stevens, Burdick and others reported favorable results in the treatment of sarcoma with the Roentgen ray.

Dr. Vernon J. Willey, of Ann Arbor, Mich., treats his patients for two to four weeks prior to operation, using a hard, low tube incased in a Friedlander shield, with good result. One case treated entirely with the ray recovered after forty-two treatments, with no recurrence a year later.

Roentgen Ray in Carcinoma.—Dr. George H. Stover, of Denver, uses a ray of good mellow quality, that will penetrate the tissue. The ray may be allowed to affect the surrounding tissue to a reasonable distance, but should not be placed too near the skin because of rays close to the wall of the tube that are of high destructiveness. All healthy parts should be protected. He rays three times a week for ten minutes each time, tube distance being eight to ten inches. He uses shields on all treatment tubes. He advised Roentgen ray treatment of primary, non-operative and recurrent non-operative carcinomas. Where there is an equal chance between Roentgen and surgical measures, advise operation and ray afterward.

Roentgen Ray in Military Surgery.—Dr. C. F. Stokes, U.S.N., described the equipment employed in naval hospitals and on board ship, and cited a number of cases in which the Roentgen ray was used to good advantage.

Treatment of Leucemia.—Dr. J. F. Smith, of Chicago, added two cases to ten previously reported, and reviewed the results obtained in the entire series. The action of the Roentgen ray seemed to be of two kinds: the local influence of the spleen and glands characterized by inflammatory reaction, if treatment is pushed vigorously, and later by the breaking down and disintegration of gland tissue, and the formation of leucotoxin, which either has an inhibitory action on the manufacture of leucocytes by the bone marrow, or it destroys the leucocytes already formed. In no case did the splenic tumor disappear entirely. With a discontinuance of the Roentgen ray, the disease, at varying periods, returns. Acute cases are not benefited at all by the treatment. Chronic cases respond more rapidly than subacute cases. The probability is that the ray holds the disease in abeyance, but does not cure the patient.

Roentgen Treatment of Hodgkin's Disease, Leucemia and Polycythemia. Dr. Henry Pancoast, of Philadelphia, emphasized the necessity for careful study of the effects of Roentgen ray exposures on metabolism, particularly in connection with the treatment of the diseases under discussion. He has found that the effects of the Roentgen ray on leucemic tissue are not the same as those on the skin in an x ray burn or an epithelioma breaking down under treatment.

Technic of Calculus Diagnosis.—Dr. Russell H. Boggs, of Pittsburg, emphasized the necessity of being familiar with the densities that may appear on the plate, and being able to interpret them correctly. In over 200 cases examined there were only two unsatisfactory results. The diagnosis from the plate should never be attempted until the plate is perfectly dry. He said that it is not difficult to make a radiograph that will show the calcium oxalate and phosphatic calculi, but if the patient is large, requires a great deal of accuracy to show the necessary detail and make a correct diagnosis. The Roentgen ray is the most efficient means for diagnosing kidney stones, but experience is necessary in the use of the method to make it valuable. Two radiographs should be taken, and the shorter the exposure the better, because there is then no motion of the parts. When the rays are intense enough to make a picture in less than thirty or forty seconds, and the tube used is so much lower in vacuum, it will give greater detail and differentiation. The radiograph should be made while the patient holds his breath, using a large amount of current with all the inverse discharge cut out. By using a rheostat in series with the primary of the induction coil, the milliamperage can be kept at a certain point. The bowels are emptied thoroly first, and no food or fluid is allowed for some time before the examination. The tube is placed about two inches from the plate.

Dr. Henry Pancoast, of Philadelphia, called attention to two sources of error in diagnosing kidney or ureteral calculi. First, a deposit of salol in the bowel and the presence of phleboliths in the pelvic veins, both of which give shadows resembling those thrown by calculi.

Dr. J. F. Smith, of Chicago, said that calcareous lymph glands and calcareous deposits in the pelvic ligaments have also been known to complicate the diagnosis of calculi.

Dr. Henry Hulst, of Grand Rapids, Mich., mentioned a case in which a fracture of the transverse process of one of the lumbar vertebræ gave a shadow that was at first mistaken for a calculus until a full history of the injury that caused the fracture was obtained.

Dr. M. K. Kassabian, of Philadelphia, cautioned against mistaking calcified lymph glands around the lower portion of the ureter for calculi. He advised inflating the urinary bladder slowly as an aid to diagnosticating stones in the lower ureter.

Dr. Charles Lester Leonard, of Philadelphia, said that when there is a stone in the ureter there is always a passive enlargement of the kidney. That fact is an aid in making a diagnosis of stone in the ureter.

Dr. Sinclair Tousey, of New York, cited a case to illustrate that sometimes the stone is on the side opposite to the one indicated by the clinical symptoms as containing the stone. In such cases the Roentgen ray is of great value in locating the stone. Radiographs for stone should include both kidneys and ureters in order to make such mistakes impossible.

Treatment of Lupus and Rodent Ulcers.—Dr. G. P. Girdwood, of Montreal, cited cases of tuberculous lupus in various stages and of varying duration, one case having existed for thirty-two years. All had been treated surgically and by applications, but without avail. All have been cured by the Roentgen ray, or relieved to such an extent that a cure is almost certain in a comparatively short time. Where dermatitis was produced, healing went on more rapidly than in cases not burned, and it continued to go on with-

out any further treatment. All his cases were treated at a distance of ten inches and for ten minutes at a time The number of interruptions to the current was about three thousand per minute. The coils used were of the 18- and 30-inch variety; 110 to 220 V.; two to six A.; mechanic electrolytic break; no condenser, in most of the cases; 440-660 Watts.

Treatment of Non-Malignant and Non-Tuberculous Skin Lesions.—Dr. W. S. Newcomer, of Philadelphia, cited cases to show that in most cases of this kind the Roentgen ray is beneficial.

Pathological and Physiological Effects of Roentgen Rays.—Dr. J. Rudis-Jicinsky, of Cedar Rapids, exposed guinea-pigs and rabbits to intense radiation daily, the first for ten seconds, and later for ten minutes, with a tube distance of six inches or less. After twenty exposures the guinea-pigs partly lost their hair, and after thirty-four exposures there were two cases of very bad necrobiosis, the condition being aggravated when a very low tube was used, backed by a spark gap of four inches and a very strong current. The longer the procedure was carried out, the lower became the resistance of the animals. Autopsy was done on two animals, and the findings were described at length. There was degeneration in the posterior horns and tracts of the spinal cord gray matter; hemorrhages in the cord; fibrous hyperplasia in the skin and the walls of blood vessels. Usually after a few exposures, even when the skin is intact, there is found a more or less profuse exudate of a clear, lemon-yellow fluid of a specific gravity of about 1.060, distinctly alkaline in reaction, which crystallizes readily on exposure to the air, and when injected subcutaneously into mice, this fluid invariably produces death within forty-eight hours. It irritates healthy skin, acting as a caustic. With the diminution of this fluid, the healing process begins.

Dr. George E. Pfahler, of Philadelphia, exhibited an x ray filter consisting of a disk of sole leather about six inches in diameter and four times the thickness of the skin. A piece of pure silver may also be used. This disk is placed directly over the opening in the diaphragm. It effectually prevents tanning or burning of the skin. The leather disk is soaked in water before being used so as to resemble skin as closely as possible. Dr. Henry Hulst uses tinfoil, aluminum or some other substance for a filter, selecting the substance to be used with reference to the effect he desires to obtain. Dr. George H. Stover, of Denver, uses aluminum foil. Dr. F. F. Strong, of Boston, neutralizes the superficial effect of the Roentgen ray by exciting the Crookes' tube by means of Tesla's high frequency currents, ionizing the area in the vicinity to be treated. Since he has been using this method he has been able to treat deep-seated tumors effectively without producing a burn. He also demonstrated a unipolar Roentgen ray tube to be used for treating lesions situated on the walls of cavities and for treating the center of tumors.

Officers.—The following officers were elected for the ensuing year: President, Henry Hulst, Grand Rapids, Mich.; Vice-Presidents, Russell H. Boggs, Pittsburg; C. E. Skinner, New Haven, Conn.; E. G. Williams, Richmond, Va., and E. W. Caldwell, New York; Secretary, George C. Johnson, Pittsburg; Treasurer, L. E. Custer, Dayton, O.; Executive Committee, K. Dunham, Cincinnati; P. M. Hickey, Detroit, and J. F. Smith, Chicago.

Chicago was selected as the next place of meeting.

The Roentgen Congress at Berlin.

Ten years have elapsed since the discovery of the Roentgen ray.

The Congress was composed of medical men, physicists and technical electricians from all parts of the world.

The opening ceremony took place at noon. The president, Von Bergmann, was absent through illness. The Minister of the Interior presided, the Minister of War, General von Leuthold, was present.

The President cordially welcomed the representatives of the British Roentgen Society, the British Electrotherapeutic Society and the American Roentgen Ray Society.

The second day was devoted to the more strictly scientific papers. Professor Wertheim-Salomonson, of Amsterdam, read a most interesting communication on the mechanical efficiency of the induction coil. He finds that the available energy is about 30 per cent. of the electric energy supplied to the coil.

A discussion on the various methods of measuring the intensity of the x rays was opened by Dr. Walther, of Hamburg, who described and criticised the various methods now in use, and gave a demonstration of a combined method of dosage based on the simultaneous use of Holzknecht's chromoradiometer and the milliamperemeter.

Dr. Kienbock, of Vienna, emphasized the necessity of *direct measurement* in radiotherapy, and showed his newly devised instrument for measuring the intensity.

Holzknecht, of Vienna, also spoke on the importance and difficulties of accurate dosage.

In his opinion, the difficulty was chiefly caused by the continual variation of intensity of the rays issuing from a given focus-tube, differing in this respect from the constant output of radium and the Finsen light. He hoped that the future would give us an instrument capable of producing a graphic record of the curve of intensity of the x rays for any given focus-tube.

Dr. Kowalski suggested that a committee of medical practitioners, physicists and electricians should be formed for the purpose of choosing a universal unit for the measurement of the x rays.

The instruments exhibited and those described, fall under the following headings, namely: the source of electrical energy, the focus-tube, the interrupter, the support of the tube, the localizer, the diaphragm, and the various means of measurement.

Focus-Tubes.—An interesting historical collection was shown, illustrating the evolution of the focus-tube, from the original Crookes tube used by Roentgen into the large bulb of the present day, with its water-cooled cathode, its mirror anode, and apparatus for increasing or diminishing the vacuum, for registering the temperature and for measuring the current. There seems of late to be a marked tendency to make the focus-tube larger. This increase in size is due to three reasons: (1) With a large tube and large anode a stronger current of greater milliamperage can be forced through the tube; (2) with a large bulb a much greater constancy of vacuum is obtainable; (3) with a large bulb the heating effect of the heavy currents which are now sent through the tube is not so marked.

The record for durability is held by a water-cooled tube exhibited by Muller, of Hamburg. It had been used for over 60,000 seconds for all sorts of purposes, without any regulation of the vacuum. Since then it had been twice re-pumped, giving a total life of over 100,000 seconds. The cost, including that of re-pumping, works out

at about one penny per minute. The tube was driven with an electrolytic break and a Wahlter's rectifier.

Koch, of Dresden, showed a new bicathodic focus-tube for use with an alternating current. The reverse cathodic stream was focussed on a point inside a metallic tube, which thus suppressed at once the x rays from this source.

Dr. Gocht, of Halle, showed a tube with a hemispherical anticathode and a platinum anode of special shape.

Professor Grunmach exhibited a focus-tube with a double tubular diaphragm placed inside the focus-tube in front of the anticathode. This seems to me to be the right situation for the diaphragm. By placing it as near the radiant focus as possible we suppress all useless rays at once, the metallic tube acting as a shield as well as a diaphragm. It may be found that this mass of metal will interfere with the complicated evolutions carried on by the electrons inside the focus-tube. Professor Grunmach, who is Director of the Roentgen Department of the Berlin University, however, expressed himself as highly pleased with its action.

TRANSFORMERS.—As regards the source of electrical energy, the general tendency seems to be to replace the Ruhmkorff coil by some form of transformer driven direct from the alternating main. The most important of these is without doubt the Grisson resonator, in which the principle of electric resonance is used in place of an interrupter. This instrument has been well received in England, and was exhibited at the soiree of the Royal Society. We hope to have an opportunity of seeing it at a meeting of our society at an early date.

An interesting transformer was exhibited by Koch and Sterzel, of Dresden. A constant current is transformed into an alternating current by a dynamo, which drives the secondary current rectifier on the same spindle, thus insuring synchronism. A step-up transformer with closed magnetic circuit is used.

Dr. Max Levy read a paper on a new form of apparatus, in which a high-tension alternating current is utilized without the interposition of any interrupter or condenser. The current is made unidirectional by means of a "strom-spalter," or current-sifter —a pair of spark-gaps, by means of which one phase of the alternating current is conducted to earth, while the other is used for driving the focus-tube. The author expressed his opinion that the next few years will see the total abolition of interrupters for high-tension currents.

INTERRUPTERS.—Dr. Max Levy described a new form of friction break. A vertical wheel, grooved at the edge, dips into mercury. This is driven by a second horizontal friction wheel. Small drops of mercury are carried by the grooves to the point of contact between the wheels, thus making and breaking the current.

DIAPHRAGMS. — Dr. Pasche, of Berne, read a paper on the exclusion of the secondary rays by means of a system of movable diaphragms. By his method an area of any size can be illuminated, whereas sharpness of outline is usually obtained by limiting the exposure to a very small area.

SHIELDS.—A wonderful collection of shields or Schutz apparatus was exhibited. Gloves, aprons and spectacles were universally worn. A manikin was exhibited, clothed in armor of x ray proof.

RADIOGRAPHS.—Dr. Rosenthal, of Munich, and Professor Rieder appear to hold the record for rapidity of exposure. They showed several radiographs of the lungs of a man of thirty, in which the details of the lung structure were clearly defined, the exposure

being the record one of one-tenth of a second.

An interesting collection of lantern slides was shown by Albers Schonberg at one of the evening meetings. They were taken from radiographs of an Egyptian mummy, and showed many of the soft parts as well as the skull, teeth and skeleton.

MEASUREMENT.—The newest development in measuring apparatus is the selenium photometer of Ruhmer Levy. A selenium cell is clamped in position at a fixed distance from the anticathode. A current from a couple of dry cells is passed through the selenium, and its intensity is read off on a milliamperemeter. The x rays alter the resistance of the selenium, and the variation of the current is therefore a measure of the quantity of the rays.

The milliamperemeter shown by Dr. Leonard was very accurate in its readings.

At the final sitting the Congress resolved to found a German Roentgen Society to meet once in every three years.

The Congress of Radiology has decided some questions of general interest.

1. It nominated, upon the motion of Dr. Dessauer, a commission of physicians and engineers to study and report upon measuring apparatus.

2. Dr. Hennecard, of Sedan, called the attention of the Congress to the question of sterility caused by the x rays, and remarked that this sterilizing action, more or less permanent, may proceed as far as to produce total atrophy of the ovaries and testicles. He claimed that legislation was necessary to prevent the voluntary production of impotency. He said the Congress should exercise its influence to prevent this social danger, by securing laws forbidding charlatans and non-physicians from using the x rays.

3. As a result of the above commission, Becher proposed a statement, which was unanimously adopted. The employment of the x rays is peculiarly a medical work. Physicians are requested to see that the laws are so amended that patients desiring and requiring x ray treatment should be treated by physicians only. They (physicians) are also requested to use their influence toward this end, and also to make known the dangers which may result, especially in the hands of incompetent and unauthorized persons.

The approaching International Congress of Radiology, which will be held at Amsterdam in 1908, should not be confounded with the Third International Congress of Medical Electrotherapy and Radiology.

The International Congress of Radiology and Ionization.

The First International Congress for the study of Radiology and Ionization was held this year at Liége, September 12-14, inclusively. This Congress was composed of two sections.

1. Physical Section—(a) The physics of electrons, including radiations of various kinds; (b) radio-activity and the corresponding transformations; (c) meteorological and astronomical phenomena attributable to ionization and the radioactivity of various kinds of rays.

2. Biological Section—This section studied and examined the physiological properties and the radioactivity of various radiations, and their medical application. A sub-commission, composed of Profs. Bonchard, D'Arsonnal, Drs. Berclere, Begonie, Charpentier, Charrin, Danysz and Audin, made a special report on this subject.

Roentgen Nomenclature

The following is the uniform nomenclature recommended by the recent Roentgen Congress at Berlin:

Roentgenology: The science of the Roentgen rays.

Roentgenoscopy: Radioscopy.

Roentgenography: Roentgen photography.

Roentgenogramm: Skiagram.
(*a*) Roentgen negative.
(*b*) Roentgen positive.
(*c*) Roentgen diapositive.
Ortho-Roentgenography.
Roentgentherapy: Roentgen treatment.
Roentgenize: To treat by means of the Roentgen rays.

The Piffard Rays.

Reference has at various times been recently made to the new Piffard rays. Dr. Abbe, of New York, Dr. King, of Bradford, Pa., and others have referred to them in current medical literature, and at Flower hospital a number of tests have been made to determine their therapeutic value. The Piffard rays have been so named after their discoverer, Dr. Henry G. Piffard, who (in *Journal for Cutaneous Diseases*, June, 1904; *Medical News*, Dec. 3, 1904) called attention to them.

Dr. Piffard noted that when the quartz plate is removed from his improved spark-gap lamp, a negatively charged electroscope is discharged more than ten times as quickly as when the quartz plate is in situ and permits the passage of the ultra-violet rays. He concludes that 90% of the radiations are absorbed by the quartz and only 10 per cent. of the rays of the spark-gap succeed in influencing the electroscope. A different phenomenon is noted when Solio photographic paper is exposed, there being but little difference when exposed to the spark-gap radiations with or without the quartz plate. With the quartz plate removed the paper darkens somewhat more than with the quartz in situ, the difference being estimated at from 10 to 15%. He concludes that about 85 to 99% of the radiations capable of decomposing the silver salts pass through the quartz plate, while about 10 to 15% are absorbed by it and fail to effect the sensitive film. "It is evident from the foregoing experiments that the radiations from the spark-gap belong, as far as these manifestations of their energy are concerned, to two distinct classes: those that specially effect the photosensitive film and those that effect the electroscope. As to the nature of the first named we need have little doubt. They are transverse undulations belonging to the ultra-violet portions of the spectrum. To what class then do the other rays belong, those which so prominently effect the electroscope and the greater part of which are absorbed by quartz?"

Experiments show that the spark-gap radiations if not impeded by quartz, discharge a positively charged electroscope also, while purely ultra-violet rays discharge an electroscope negatively charged only. This seemed to demonstrate conclusively that in addition to the ultra-violet rays, some other radiations were added when the quartz plate was removed. Dr. Piffard at first thought that these were negative electrons and expressed the opinion that they would act vigorously on the tissues similar to a low tube x ray or radium, the reaction, however, appearing more promptly. Experiments made by Dr. Milton Franklin, Dr. Pegram and Dr. Piffard showed that these rays were not deviable in a magnetic field, thus excluding the proposition of negative electrons. The probable identity with the Entladungsstrahlen of Wiedemann is suggested but the latter have not been tested elec-

troscopically. It is assumed, therefore, that the phenomena observed are due to ions, which are always present at the site of an electric spark, the tremendous pressure at the spark-gap driving the ions in every direction and effecting such tissues exposed to their action. These so-called Piffard rays have been tested for the past three months at Flower hospital and in private practice and some remarkable results have been observed. A lesion 4x6 inches in size, which had been diagnosed microscopically as lupus vulgaris, absolutely cleared up, the pus and nodules disappeared and restitutio ad integrum supervened after eight treatments of about 5 to 10 minutes each, treatment being tri-weekly. In a case of sycosis the lesion dried up and the parts resumed normal conditions after three successive treatments of two minutes each at each station. In a case of epithelioma in which the new agent was tried the results were negative and re course to the x ray was compelled. The action as thus far observed is to produce a thickening and hardening of the epidermis with whitish exfoliation which can be readily cureted away or scraped off. The underlying cutis vera appears to be markedly hyperemic and slightly edematous in patches and local leucocytosis is present. The further development of the use of this new ray is awaited with much interest. Dr. Piffard has also constructed an "ionizer," so-called, for utilization of this force in the cavities of the body.

A New Radiometer.

By Dr. D. Courtade (*Bull. Off. de la So. Fran. D'Elect. et Rad., 1905*).

The employment of x rays, either in radiography or in radiotherapy, requires a means for the exact measurement of, first, the quality of the rays emitted, second, of their quantity.

We have two instruments which satisfactorily measure the quality of the rays, i. e., the spintermeter and the radiochrometer.

But there has been, up to the present, no precise method or instrument for measuring the quantity.

It is possible to measure the quantity indirectly, as by the milliamperemeter or Gaiffe, or to utilize directly three properties of the x rays:

First—The ionozation of gas and other conductors of electricity.

Second—The chemical action upon a great number of substances.

Third—The property of rendering bodies phosphorescent or fluorescent.

Each of these effects have given birth to various methods.

My radiometer is based upon the property that x rays render cyanide of platinum fluorescent.

In my new radiometer the standard of comparison is the luminosity produced upon the screen by the radium. A plaque of lead is covered with a layer of cyanide of platinum. There are two openings, of the same size, in the plaque. Behind one of these holes a few centigrammes of radium, of medium intensity only, are fixed by an immovable piece. It is separated from the screen only by a thin photographic film, or by a plate of aluminum .01 mm. to .02 mm. thick.

It is found that a certain quantity of x rays will give, at a certain distance from the screen, a luminosity equal to that given by the rays of the radium.

This instrument, as constructed by M. Gaiffe, is composed of a metal plaque, pierced at the center by an orifice, 1 to 2 cm. in diameter, and around this center there are twelve others of the same diameter. The radium is attached behind the central opening as above. Over the twelve openings are fixed twelve disks of silver, .02 mm. to .16 mm. in thickness. The above apparatus is mounted in a box, which carries in front a platino-

cyanide of baryum screen. The instrument is always placed at the same distance from the anti-cathode, and then the luminosity of the silver disk will equal that produced by the radium. The radiometer should have a plaque somewhat like that of the radiochrometer of Bonvist. In place of the dipositive of M. Bonvist, I compare a silver disk arranged in a medium line with twelve sectors of aluminum placed in series of six on each side of the silver plate.

Action of the X Rays on the Platino-Cyanides, Especially on Those of Barium.

By H. BORDIER and J. GALIMARD (*Arch. of the Roentgen Ray*, Aug., 1905).

It is known from the experiments of P. Villard that when platino-cyanide of barium is exposed to the x rays it gradually loses its green color and acquires a tint which, at first yellow, becomes like that of mosaic gold These changes of color have been recently utilized in radiotherapy to estimate the quantity of x rays absorbed during an exposure.

Villard has also shown that platino-cyanide, after having been darkened, regains its normal color, and that this is due to the effect of light, which produces a chemical action exactly the reverse of that of the x rays.

The experiments which we carried out during some months on the chemical effects of the x rays have shown: (1) That the change of tint is a phenomenon of dehydration; (2) that the return of the salt to its initial state is the result not of light, but of rehydration.

The following are the experimental facts, which may be easily verified:

A little platino-cyanide of barium is placed in a porcelain cup, and is exposed to the x rays until it loses its fluorescence; at this moment the salt resembles powdered mosaic gold. The same result—loss of fluorescence and change of tint—may be obtained by any process capable of dehydrating the platino-cyanide. For instance: (1) By slightly heating the salt; (2) by drying the platino-cyanide under a bell-glass containing sulphuric acid or chloride of calcium; (3) by introducing the salt into a vacuum; (4) by triturating it in a mortar.

In all these operations the salt loses water, and changes in color from a fluorescent green to a non-fluorescent brown.

The x rays produce the same effect by destroying the chemical equilibrium of the hydrated salt, which is characterized by a green fluorescent color.

When platino-cyanide of barium has been modified by one of the above processes, it can, as we know, regain its color and former fluorescence. This, however, is not due to the action of light, for if *darkened* platino-cyanide be placed in circumstances such that it can take up the water necessary for rehydration the color, *even in total darkness*, gradually returns towards yellow and green, and the fluorescence progressively increases. If, however, the aqueous vapor be prevented from coming into contact with the platino-cyanide, it retains its brown color indefinitely, *even in the presence of the most vivid light.*

Radiographs as Evidence.—An interesting illustration of the evidential value of physical processes, and the unquestioned acceptance of their testimony, so far as it goes, is afforded in a recent utterance of the Iowa Supreme Court in State vs. Matheson. In its decision the court said that the process of x ray photography is now as well established as a recognized method of securing a reliable representation of the bones of the human body, although they are hidden from direct view by

the surrounding flesh, and of metallic or other solid substances which may be imbedded in the flesh, as was photography as a means of securing a representation of things which might be directly observed by the unaided eye at the time when photography was first given judicial sanction as a means of disclosing facts of observation; and, for that purpose, x ray photographs, or skiagraphs, or radiographs, as they are variously called, have been held admissible on the same basis as photographs. Therefore the court has no difficulty in holding that a radiograph admitted in evidence in this case, after proof that it was taken by a competent person, was admissible to show that there was in the body of the person of whom it was taken, at the time it was taken, some hard substance, in the shape of a bullet, near the spinal column. True enough, there was no evidence that this object which was represented in the radiograph was a bullet, but it was proper for the jury to take the evidence for what it was worth, as indicating that something in the shape of a bullet was lodged in the man's body. Whether it was in fact a bullet, they must determine, just as they would have been required to determine the fact if the witness had testified that he saw something the size and shape of a bullet. That was all he could have told simply by looking at it if it had been exposed to view. Of course, evidence as to the location of the bullet at a time subsequent to that when it first lodged there after being fired would not be material in determining the course that it took, unless there was some reasonable ground for assuming that its location had not changed in the meantime. But the court thinks it can properly take judicial notice of the fact that a bullet imbedded in human flesh usually becomes encysted, and does not change its location without external interference. And it seems to the court that the probability that the bullet, when discovered by means of the radiograph, was in the same position that it was when first lodged in the man's body, was sufficiently strong to have warranted the jury in taking the information furnished by the radiograph for what it was worth, in their judgment, in determining whether the course of the bullet after entering the body was downward or upward.—*Medical Standard* 1905.

The Effect of Photodynanic Substances Under the Action of X Rays.

(Deutsch. Med. Wochenschr.)

Kothe has tested various coloring matters under the action of x rays. He found that the blue-green, green and violet tinctures increased at least one-half the value of photo-negatives. Orange or red colors were without effect.

He also experimented by injecting various coloring matters under the skin, and then submitting the subject to the action of the x rays. When a weak solution of eosine (1-100 to 1-1000) was injected under the skin and exposed to the x rays, the reaction was greatly increased. Lesions thus treated were broken down and cured much more quickly than under ordinary conditions. His experiments on wolves gave positive results. The parts of the body, previously injected with eosine, treated by the x rays, presented well the characteristic reaction—ulceration and destruction of the skin; while in those regions that were not injected there was no ulceration nor destruction of the skin.

Kothe considers that the results of his experiments give us the means of producing the most violent reaction in the least possible time. Such a method is very peculiarly applicable in certain malignant diseases.

Differential Diagnosis of Calculus Shadows.

At the regular meeting of New York Academy of Medicine, Mr. E. W. Caldwell exhibited a number of radiograms which showed very clearly the pseudo shadows which had given rise to many mistakes in the diagnosis of ureteral and renal stone by the x ray method. He cited a case in which diagnosis of three ureteral stones had been made by a very competent x ray operator. These shadows lay directly in the course of the ureter and had been interpreted both by the x rayist and by the operating surgeon to be ureteral concretion. Mr. Caldwell himself obtained an exact duplicate of the previously made plate. This, it should be conceded, placed all doubts of diagnoses out of the possible and the surgeon operated. He was disappointed to find no stone in the ureter. The speaker had noticed that many of these pseudo-shadows are to be seen in the neighborhood of the ischiatic spine. It had occurred to him that they might be cast by sesamoid bones in one of the obturator tendons. He had been unable, however, so far to prove this supposition.

Dr. George E. Brewer stated that in his opinion the calcification of an epiploic appendix was probably but one of a number of different origins for these extra-ureteral concretions.—*Medical News*, April 22, 1905.

The Employment of Radiography in Dental Surgery.

By G. Schuwartz, Surgeon-Dentist to the Faculty of Medicine of Paris (Arch. d'Elect. Med.).

During the last few days I had a case of phlegmon of the left jaw. The patient was a man thirty years old. A few days after he was first seen, the jaw being rigid, the patient was sent to Paris to the clinic, where a diagnosis of phlegmon of the lower left wisdom tooth was made.

An operation was determined upon, but to be absolutely sure, Lariboisiere was requested to make a radiograph.

An examination of this revealed that the lower third molar had developed above the lower second molar.

The patient refused operation and returned to Montpellier.

The mouth could be opened only about one centimeter; and at the base of the jaw, in the maxillary angle, there was a large lump, hard, without fluctuation or pain.

I forcibly opened the mouth, in order to examine the dental system. I found the lower second molar without caries, but with a dead pulp, and at the side of the gum a small simple fistula.

The part of the gum involved appeared to be as hard and resistent as the crown of the tooth.

I was very much perplexed over the result of the examination. Apparently we had to deal with a vicious evolution of the wisdom tooth. This conclusion was based upon the radiograph made in Paris, the modification of the pulp, and the absence of caries.

On the other side, percussion showed the tooth itself to be intact. This fact, together with its normal position, caused me to think that it was not a case where a wisdom tooth had developed at the expense of the molar.

I requested Prof. Imbert to make a radiograph of the patient's maxillar. The first proof enabled one to distinguish nicely all the teeth.

A second proof was necessary to enable us to determine the exact facts. This showed that the affected wisdom tooth had developed upon a lamella of bone in the gum.

I prescribed emollients and antiseptics, and in twelve days the rigidity was very much diminished, likewise the external induration.

I have employed radiography many times in cases of dental evolution

caused by accidents. I have known two very curious examples. The first was a case of Dr. Bettronu, which suffered from facial neuralgia for a year. This case resisted all treatment and all medication. The patient suffered severe pain from the left nares to the cranial fossa. Having an idea that some dental trouble was the cause, Dr. Bettronu found, on examining a radiograph of the superior maxillary, that a supernumerary tooth had developed from the bone of the canine fossa. The supernumerary tooth was extracted and found anomalous in form but normal in structure tissue.

I have found radiography of the greatest utility in revealing conditions which would have never been suspected otherwise. This has been found especially true of accidents during the development of the wisdom teeth, necrosis of the pulp, occasional diffuse phlegmon, adeno-phlegmon, aiveolar necrosis, and in myelitis of the maxillary.

The Diagnosis of Pulmonary Tuberculosis by the X Rays.

(Clinical Society of London, séance der anal. in *Presse Med.*)

Green and Brook have made radiographs of a large number of subjects, and have secured precise results of great interest. They have been able to make positive diagnoses from the appearance of physical signs. The shadow spots, the mobility of the diaphragm, the form and inclination of the chest, the size of the intercostal spaces, all were utilized in arriving at positive and definite diagnoses. Not only were they enabled to make positive diagnoses in tuberculosis, but also to determine the inflammation of the pleura and the hypertrophy of the mediastinal ganglions.

Colitis and High Frequency Currents.

By EDWARD W. H. SHENTON, M.R.C.S. (Eng.), L.R.C.P. (Lond.), Radiographer to Guy's and St. Peter's Hospitals (*Arch. of the Roentgen Ray*, Aug., 1905).

A very valuable use of the high-frequency currents, and one to which attention has not hitherto been drawn, is their beneficial effect in colitis, both of the mucous and ulcerative variety.

Four years ago one was consulted on the advisability of x ray treatment in an obstinate case of ulcerative colitis. It was agreed by those in charge of the case that the beneficial effects of the x rays, so noticeable in ulceration generally, warranted their application in this particular instance. One undertook the treatment, however, with no sanguine hopes of success, on account of the impossibility of the rays having effect through such a depth of intervening tissue. About a month of almost daily exposure of the abdomen to weak x rays produced no effect. The patient had been troubled for over a year with the complaint, and at this time was passing blood and mucus. There was chronic diarrhœa, he having to get up invariably eight times during the night. His general health suffered considerably, and he was incapacitated for work.

As a forlorn hope, therefore, one suggested high-frequency treatment, hoping that the benefit to the general health, which so constantly attends the administration of these currents, would indirectly affect the disease.

After the first few applications, given on the condensor couch through the hands for ten minutes, followed by fifteen minutes' local application, sometimes from the low tension, sometimes from the resonator, there was a marked change in the patient, but not in his colitis symptoms.

Being encouraged by this result, it was decided to settle down to a prolonged course of treatment, the patient attending on alternate days.

For a fortnight or so his general health improved steadily; his appetite

came back, and he slept well, except for the nocturnal interruptions mentioned above. Next followed a gradual cessation of the symptoms. The diarrhœa was less, the blood was less, as well as the pain.

Each week would see him called up less often in the night, until a morning came on which he said he had passed the previous night undisturbed. The progress was sure, altho somewhat slow, it being about nine months before he was completely well.

The Treatment of Dullness of Hearing and Subjective Noises in the Ears by High Frequency Currents.

In the *Glasgow Medical Journal* this interesting subject was discussed by Drs. Galbraith, Connal and James R. Riddell. The case as selected for electrisation were ones in which other methods of treatment had been used but found ineffectual. For instance, in chronic catarrh of the middle ear, catheterisation of the Eustachian tube or inflation of the middle ear had been tried. In nearly all, complaining of tinnitus aurium, drugs, such as bromides, hydrobromic acid or strychnine had been used ineffectually. In addition, any nasal defect which might have an influence on the aural condition was rectified. If recognized methods of treatment failed to effect any improvement in hearing or lessen the tinnitus, these patients were sent to Dr. Riddell for electricity. In all, forty patients were treated, but final results could not be obtained in eight of these, leaving thirty-two cases to report. Notes were taken of the hearing distance with the watch and the tuning fork reactions. These were carefully checked after the treatment had been discontinued.

1. Chronic dry catarrh of the middle ear with labyrinthine involvement (6 patients). No improvement in any of them, but two patients thought that the noise had decreased.

2. Chronic dry catarrh of the middle ear without marked labyrinthine involvement (14 cases). Ten of these had tinnitus, eight reported improvement. In one case the noise disappeared altogether. In two cases there was some improvement of hearing.

3. Post suppurative conditions (5 cases). Five had tinnitus and four reported improvement.

4. Sclerosis of the middle ear (5 cases). All showed improvement, markedly so in three and slight in two. In one of these, who had persistent and loud tinnitus for four years, there has been no noise for the last four months.

One case of primary disease of internal ear and one of tinnitus, without deafness, derived no benefit from treatment.

The treatment of diseases of the ear by high frequency currents may be carried out in various ways. The patient may be treated by general electrification or local application of the currents, but it must be remembered that local applications have a general effect.

Local applications may be applied as follows:

1. By means of the effluve taken from the resonator applied to the side of the head. The multiple electrode is held as near the patient as possible without producing sparking.

2. By means of condenser electrodes, which are attached to each end of the solonoid, and introduced into the external auditory canal.

3. By metal electrodes, placing one against another, that is applying the currents "by derivation." This method is apt to be painful unless carefully done.

It has been shown by D'Arsonval and others that high frequency currents have a profound effect on nutrition generally. Under their influence

there is a great increase of the secretions, and in the output of heat. If the benefits derived depend on these properties, then the proper way of applying treatment would be by general methods. There may, however, be other explanations. There is a great alteration in the circulation produced by the currents, not only in the general arterial tension, which is first lowered, then raised, and remains above the normal for a considerable time, but there is a marked local effect, the capillaries being greatly dilated.

There is another possible explanation, namely, there may be a fine mechanical vibration set up by the passage of the current.

In connection with the supposed germicidal effect of this form of electricity, it has been suggested that the cultures are rendered sterile by the mechanical vibration set up in the media. On account of these properties —alteration of local supply and mechanical vibration—local treatment may be expected to be more useful than general.

Muco-membranous Entero-colitis, a disease which is receiving much attention of late, has been favorably influenced by applications of the static wave treatment. The technic which we recommend is as follows: The patient is seated on the insulating platform, the abdomen bared and a large, smoothly rolled sheet of lead foil 6x8 inches is fastened snugly over the umbilical region. This electrode is connected with the positive pole of the static machine, the negative pole being conducted to the earth via the gas pipe or water pipe. The poles are slowly separated until a spark of one and one-half to two inches is secured, treatment lasting eight to ten minutes. This treatment is repeated tri-weekly until improvement is noted, when it may be gradually suspended. The beneficial results are due probably to the stimulation of the solar plexus and the general improvement of the central nervous system, as the above disease is almost invariably associated with neurasthenic symptoms of more or less severity, and the improvement of the latter is followed by diminution of the alvine mucous discharges. Besides electricity, the use of enemata frequently repeated (oil treatment of Kussmaul) and appropriate diet and symptomatic remedies contribute to a successful outcome of this disease.—*N. A. Jour. Homoeopathy,* 1905).

F. ALLARD (*Revue de Therapeutic*) reviews the physiological methods of treating obesity

He employs static, high frequency, galvanic and preferably the sinusoidal current.

The spray is utilized in neurasthenic cases of obesity, giving 15-20 minutes' treatment every second day. This is given to add tonicity to the nervous system and to regulate nutrition.

The high frequency currents are administered in the form of auto-conduction and condensation and are especially recommended in the arthritic and gouty obese. Treatment is given three times a week for twenty-five to thirty minutes. The purpose of the treatment is to stimulate organic combustion and to increase the elimination of waste.

The galvanic and sinusoidal currents are applied in the form of the hydro-electric baths. Guilloz (Nancy) gives 150 M. A. galvanism applied by means of large electrodes placed at different stations over the body. The author prefers the sinusoidal current given for thirty to forty minutes, 100-120 M. A. Repeat three times weekly. The only contra-indication for this treatment is fatty degeneration of heart where electricity is poorly borne. The author also employs with much success the

electric light bath and the hydro-electric bath (sinusoidal), the combination being highly recommended. He claims to have obtained in some cases a diminution of 8, 10 and even 15 kilogrammes (18-33 lbs.) within two months' treatment. Faradism may also be employed locally over muscles to produce vigorous contractions. Vibration is also recommended, this treatment being preferred for localized adiposity. He makes a strong plea for the employment of vibration by physicians so as to rescue this valuable procedure from the hands of masseurs and other empirics.

Treatment of Alopecia Areata with Currents of High Frequency.—Luigi Vardiani records the treatment of a case of areata of a year's standing, which had been rebellious to all forms of treatment. The disease involved three-fifths of the entire scalp, as well as a large portion of the beard. The patient was forty-eight years of age, in the best of health and in good circumstances. He had had rheumatism and multiple osseous lesions, probably tubercular, as a child, and was of a nervous habit. The disease reached its full severity in fifteen days from its beginning, leaving many circular bare spots in scalp and beard, over which the skin looked normal, with no vesication or desquamation. High frequency current was used at first only on the scalp; duration of the application two to eight minutes, for twenty-four sittings. Hyperemia of the skin was produced to varying degrees over different locations, where it was greatest being the spots that were most quickly covered by hair. The hairs were at first fine and white, then became thicker and for the most part black, a few being white, corresponding with the hair over the normal scalp. The cure began from the periphery of the patches, extending in toward the center. The beard was not at all improved until direct applications were made to its bare areas. The recovery of the case was complete. The author believes that this case tends to show that this is a disease caused by a discrasia rather than by a parasite, as shown by the centripetal effect of the current.—*Rivista Internazionale di Terapia Fisica.*

Faradic Treatment of Urinary Incontinence.—This method of treatment is particularly effectual in children, and especially in those who have had incontinence from the earliest infancy. Of forty subjects, fifty-five per cent. were cured by Genonville and Compain (*La Presse Medicale,* 1904, No. 38), and sixty-three per cent. of the children between six and twelve years old. The sittings numbered from five to eight in the "congenital" cases, while the others required six to sixteen, with the exception of five, who had twenty to twenty-nine sittings. Improvement during the first week, even if slight, is a favorable sign that a cure will be attained finally. The electricity may be applied directly to the sphincter or to the region. All but twenty per cent. of the subjects were improved or cured, and in sixteen a complete cure was realized in a maximum of sixteen sittings.

The Treatment of Common Lupus of the Skin and Mucosa by High-Frequency Sparks. (Revue Inter, d'Electro. et de Radiother, 1905.)

In 1904 Suchier of Freiburg published a system of treatment of lupus by the discharge of little sparks upon the diseased parts previously to curetment.

This treatment was very effective. Strebel had already reported his experience in the Deutsche Med. Woch, 1904. His procedure renders curetage unnecessary.

The high-frequency currents should not be transformed static electricity.

The method should be elastic enough to meet the demands of each sitting. High-frequency sparks cause the molecular destruction of the lupic nodule. Better results are secured by using the process of Oudin. In about 5 seconds the skin becomes whitened, the vascular engorgement relieved.

The sparks should be applied for 10 to 20 seconds. The following day the skin peels off and a superficial ulcer results. With each sitting the inflammation spreads, but the suppuration is moderate; and the œdema does not threaten life. The cicatrix is pale and attached to the adjacent tissue.

This procedure has the excellent advantage of applying to the diseased part the whole of the electric energy. It unites the power of mechanical and thermal effects and electrolysis.

The histological structure of the tissue is modified, the cells destroyed, the circulation established and the nutrition of the tubercle is arrested; the inflammatory reaction eliminates the dead tissue. Histologically there is a cellular infiltration in the deeper layers of the epiderm by sanguinous extravasations and vacuolization of the internal tunic of the arteries. The destruction of the nodule produces in less than 25 seconds a superficial ulceration. Very beautiful cosmetic results are obtained also in erythematous lupus, the rosacea, and lupus nævus.

Strebel applied the same method successfully in the treatment of epthelioma. He places the point of the electrode upon the skin, the sparks of which are only 1 to 2 millimeters long. There is only a very slightly disagreeable sensation. He then interrupts the current, detaches the epidermis with forceps or a curet. This is accomplished with little difficulty or pain. Then the current is again turned on and applied to the same spot for 10 to 15 seconds. This treatment is very convenient when the mucosa is involved and has to be treated. A solution of cocaine and adrenalin should be used to deaden sensibility. In this case the electrode employed is formed of a pointed wire fused in a glass tube. This is a most rational mode of treating lupus of the mucous membranes. It is so convenient, the dose so easily controlled, and it is effective. A combination of this treatment with that of Finsen would shorten the time very much in the length of time necessary to secure a cure.

The spark treatment is above all a useful adjunct in the treatment of cases which do not yield readily to the light treatment. It is especially advantageous from the good cosmetical results secured.

Sinusoidal Current.

The February, 1905, issue of *The Electro-Therapeutist*, Lima, O., H. C. Bennett, M. D., editor, is devoted to the Sinusoidal Current. We quote from that portion of the article relating to its therapeutic uses:

"When we consider how many of the normal processes of the body, such as assimilation, circulation, secretion, excretion, locomotion, etc., depends directly upon muscular tone and vigor, it will be seen at a glance what a wide range of therapeutic application is possessed by this form of current in the field of muscular excitation alone. It has been highly spoken of by many competent electro-therapeutists as a means for improving the nutrition and growth of muscular tissue whenever it is failing from lack of proper excitation.

General muscular weakness, local paralysis or paresis, lack of intestinal peristalsis, vaginal and rectal prolapsus due in whole or in part to lack of muscular tone, and vaso-motor debility are some of the conditions in which the form of current has proven especially beneficial.

It has been said that the sinusoidal current is remarkable for the little amount of sensory excitation it causes, and so permits powerful muscular contractions without discomfort. Further than this it serves to allay pain. It is as much if not more serviceable in this way than is the current derived from the secondary induction coil of many turns. Apostoli and others have borne strong testimony to the fact that the greatest success they have attained with this form of current has been in allaying

the pains that occur in connection with the pelvic organs. The pains caused by uterine inflammation, pelvic cellulitis, ovaritis, salpingitis and congestion are quickly allayed by it. Neuralgic pains are relieved and those of spinal irritation. Marked effects on tissue metabolism have been noticed also as indicated by increased consumption of oxygen and more rapid elimination of carbon dioxide. These effects are in all probability secondary to and dependent upon the increased muscular activity and analgesic influence of the current."

Combination of Radiotherapy and Organotherapy.—In order to determine to what extent organic preparations may be rendered radioactive by exposure to this substance, V. Poehl and V. Tachnoff (*Berl. klin. Woch.*, 1905) made a series of experiments with spermin, ovarin, thyreodin, cerebrin, etc. A method was at first devised by means of which absorbent cotton was rendered radioactive, the air being forced through the cotton after it had been in contact with a solution of 1-1,000 radium bromide solution. In about half an hour this cotton is strongly radioactive, and if placed in contact with any one of the various organo-preparations, it imparts its radioactivity to the latter. Tests showed that the mammin seemed to be the most sensitive. It is claimed that these organic products exert a selective influence on the same type of organs from which they are originally obtained, so that it seems possible that the radium emanations may thus be made to exert their effect on these same organs. Clinical experiments with the preparations is now desirable.

A Tumor of the Jaw Treated with Radium.—Dr. Abbe also reported the case of a woman, eighty-six years old, who had been referred to him. She had a fracture of the lower jaw on the left side, while the other side was occupied by a growth involving the bone and extending into the mouth. The growth was fungus in character, bled readily, resembled sarcoma, and had involved the bone to such an extent that shortly afterwards a spontaneous fracture of that side of the jaw occurred. A small incision was made into the growth; into this the tube of 10 cg. strongest radium was inserted and tied and allowed to remain for over six hours. As a result of this single exposure to the action of the radium, the growth had shrunk to a comparatively small size; it had become fibrous in character, and had ceased to bleed. The growth had not yet been examined microscopically, but it had all the appearances of a giant-celled sarcoma.

X Ray Treatment in Prostatic Hypertrophy.—In view of the fact that hypertrophied prostate in most instances is due to a glandular proliferation, and therefore contains epithelial elements very susceptible to the Roentgen rays, Dr. Moskowicz, of the Rudolph Hospital, has treated a number of cases of this kind by radiation through the rectum. The results were good, and after a few treatments the patients were able to urinate spontaneously, and the improvement has persisted. Large indurated prostates became smaller and softer. It is the intention of Dr. Moskowicz to try radium in other cases as being more suitable and probably more efficient.—*Int. Jour. Surgery.*

X-Ray Treatment of Cancer.—The microscopic changes in the tissue, says E. G. Williams, of Richmond, Va., should be our guide as to the therapeutic possibilities in the x ray treatment of malignant growths. It is evident, he states, that the elements of the tissues are affected according to their vitality. Dead organic matter is unaffected, and the more active the

growth the greater the effect. Next to this is the accessibility of the tissues to the rays. Hence the better results with superficial or skin cancers. That moderately deep tissues can be affected is shown by experience, and the way to reach them without producing necrosis of overlying tissues is to lengthen the distance of the tube and the time of exposure. For deep growths, radical surgical measures should be recommended, as the patient should be given the benefit of the probability rather than the possibility of good results. In such cases, however, operation might be rationally followed by x ray treatment to destroy what may remain of the malignant growth. Inoperable cases should be treated by the x ray, because remarkable results have been obtained and the most distressing sympton of pain relieved.

A Tumor of the Eyelid Treated with Radium.—Dr. Robert Abbe presented a man, forty-five years old, who had been referred to him by Dr. Peter A. Callan, on account of a suspicious tumor involving the right lower eyelid on its free border and both surfaces. It was originally about the size of a hazel nut, i.e., one and one-half centimeters long by one centimeter thick and one centimeter deep, and had resisted six weeks of x ray treatment It had been there one year and was gradually growing larger. It had all the clinical appearance of epithelioma. It was itchy, gave rise to a disagreeable discharge and bled freely on contact. Three applications of the radium had been made one month ago, and one recently, and, under its influence, the tumor had almost disappeared, being now, after six weeks, not more than a fiftieth of its former size. Dr. Abbe said he hardly thought any further applications would be necessary, but he would report the final result later. The radium used was in three sealed tubes, one of ten centigrammes of Curie radium chloride (300,000), one of five centigrammes, same strength, and one of ten milligrammes German radium bromide (1,000,000).—*Medical Record,* 1905.

Cancer of the Cervix Treated Successfully by Radiotherapy.—Haret describes this case. The patient was sixty-five years old, and had been refused an operation on account of her age and the invasion of the vaginal wall. Radiotherapy was tried, with one sitting a week. The lesion was treated with the direct rays, while the vaginal was protected by a glass tube impermeable to the x rays. After the second sitting the pain decreased, and after the sixth, not a trace of the primitive lesion could be either seen or felt. The ulcerated parts were cicatrized. Cases of this kind are rare, according to Haret, for surgeons are not apt to subject cervical cancer in the first stages to treatment by the x rays. Early treatment is an important factor in radiotherapy.—*La Press Médicale.*

A New Field for Radiotherapy in the Treatment of Goitre.—Görl has tried radiotherapy in goitre, with what he considers very encouraging results. Seven cases were treated, and in all there was marked diminution in the size of the growth, as well as improvement in the other symptoms. The author believes that it is primarily the parenchyma cells that are affected by the rays, and not the blood vessels, as the diminution in size of the gland begins so promptly and takes place so uniformly. Medium soft, or soft tubes were employed, and at a comparatively short distance from the skin. Care is necessary to prevent burns; in one case the author found the patient's skin was unusually sensitive to the rays, and he suggests that this condition may be one of the symptoms of the disease.—*Medical Record.*

The Treatment of Ringworm of the Scalp by X Rays.

By GEORGE B. BATTEN, M.D. (*Archives of the Roentgen Rays*, Aug., 1905).

Everyone with any experience of ringworm is soon convinced that the great difficulty of the treatment of ringworm of the scalp and other hairy parts, compared to the very easy cure of ringworm of the body, is due to the presence of the fungus in the deeper parts of the hair roots, where it is almost impossible to get any drug to penetrate. This is the case whatever variety of the fungus is the causative agent, whether *Trichophyton, Microsporon* or *Macrosporon,* or the *Microsporon Audounii.*

In x rays we have an agent by which we can make the hairs fall out from the bottoms of their follicles for a certainty, thus overcoming the difficulty of the treatment of ringworm of the hairy scalp, making it as easy as that of the rest of the body. The method I adopt is this:

1. Mark out carefully on the scalp every place where there are any broken ringworm hairs.

2. Cover a boy's ordinary close-fitting school cap on the outside with a continuous, fairly thick layer of white lead, covering this in turn with linen or muslin. The parents usually can do this quite well.

3. Cut holes in this white lead screen to correspond with all the ringworm patches to be treated.

4. Expose the scalp through these holes to x rays from a medium or moderately hard tube, for ten or eleven minutes, not longer, for six times within a fortnight, preferably every other day, *i.e.,* six times in eleven days. The scalp should be six to eight inches from the anti-cathode and care should be taken that the ears, neck and face are well protected from the x rays. either by the white lead cap, or by other such shield, or, better still, by a diaphragm over the tube limiting the x rays to the area under treatment.

X Ray Leprosy Treatment.

It is stated that American surgeons connected with the Board of Health at Manila, P. I., are treating leprosy very successfully with Roentgen rays. Of twenty-five cases, six are reported as actually cured, while several patients, portions of whose bodies were gone, have recovered on account of the check of the disease, no trace of germs being discoverable in the blood.

Radiotherapie Applied to the Treatment of the Pruriginous Dermatoses.

By Dr. J. Belot (Arch. d'Elect. Med.)

For some years x rays have had a preponderant place in medical literature.

It has been the application of x rays to the treatment of malignant neoplasms which has been responsible for many of the publications.

M. M. Brocq and Bisserie have communicated many of these questions to the Societe de Dermatologie. A collection of the works of this year upon radio-therapy will be reported at the congress in Berlin.

With all the criticism which has been made about the employment of the x rays, they yet render important service in the treatment of a large number of diseases.

I wish to make known the results that I have obtained by this method in a certain number of purient dermatoses. My experiments were made at the Broca-Pascal hospital, in the department of radiotherapy, under the control and direction of Dr. Brocq.

The objective aspect of the various diseases included in this group differ, but in all there is a common element, the pruritus. Dr. Jacquet has said that pruritus and eruption are the two elements always associated; both of them depending upon a more important factor, which must be overcome in connection with the symptoms or alone.

Alone, the x rays usually exercise

only a slight effect upon the pruritus. Where the pruritus is complicated by cutaneous lesions, the Roentgen rays alone are seldom able to dissipate the pruritus, but it does exercise a favorable influence upon the concomitant dermatoses. When these disappear the pruritus ceases. There is an important question in this connection which needs to be settled. Do the x rays possess the special power of effecting an elimination of morbid products?

The diseases that were treated without medicine, reported in the article, are neurodermatitis, prurigo, lichen ruber, planus and eczema.

In a case of pruritus in the lumbar region, neither static electricity nor high-frequency currents had any noticeable effect. But I obtained a reduction of the pain at one sitting, and a complete disappearance of it after a few sittings with x rays.

But my results have not agreed with those of Sjogren and Sederholm in vulvar or anal pruritus.

I use rays of slight penetration, of which but a small quantity will be absorbed, so that the local effect will be more pronounced. The rays are those numbered 4 or 5 by the radiochrometer of Benorst; the 3 or 4 units are absorbed at a single sitting. These applications ought, without inconvenience, to be repeated successively ten or twelve days.

Ordinarily the pruritus is lessened in two or three days, and completely ceases in ten or twelve days.

If there is a relapse in a month or two, a few applications will be sufficient for a cure. Still there are a few cases which are failures.

In case of pruritus with lichen and neurodermitis circumspect I have made positive cures.

Usually patients have suffered years with these diseases, and nothing seems to give any special relief.

Two months are required to effect a cure in an obstinate case, but others only require about twelve days.

In obstinate cases I use rays number 4 or 5, and cause the absorption of 5 or 6 H. units.

In all cases there was a noticeable amelioration. The majority were completely cured, and a few failures, but such cases were exceptional.

In cases of pruritus of the scrotum I have had good results, and notice the same phenomena which has been so well studied by Albers Schnoberg.

In cases of prurigo or Helrei, the pruritus totally disappears in the first few days after irradiation. The persistent erythema is accentuated little by little, the skin desquamates, the excoriations disappear, and the skin assumes its normal appearance.

In all these diseases the effects of the x rays locally, and in effecting a cure, were similar.

How do the x rays act in these cases? Is it due to its action on the nervous system? Does the new form of energy stimulate the bio-activity of the skin? In all cases the x rays play a double role. They exert a sedative effect on the pruritus and modify the dermatosis itself.

Whatever the cause or action, the good results obtained is the main thing.

I do not claim radio-therapy to be an universal panacea. It cannot replace attention to hygiene, nor can it replace many preparations that are applicable to local, external conditions.

I do not advocate the exclusive use of the x rays in these varieties of skin diseases. But when ordinary treatment and medicaments fail, the x rays are the only thing to be relied upon.

Radiotherapy.

(Revue Int. d'Electrother. et de Radiother.)

To obtain and utilize the greatest possible totality of the radiations of radium is theoretically more easily secured by the employment of radio-active air or water. These may be used and applied in the same way and by similar apparatus as the compressed air bath. A mixture of plain air and radio-active air may be used. The radio-active water may be administered in several ways, just as is found most convenient, or rendered possible

by the morbid changes produced by the disease; as ingestion by way of the oesophagus, or, better still, by veneous or sub-cutaneous injections.

The action of the radiations on tumors, cancers of the breast, for instance, should be studied thru interstitial injections into the morbid mass.

Such applications should be made with prudence, after getting what light is possible from animal experimentation.

Fibrosarcoma Treated by Roentgen Rays.

C. E. Skinner (*Arch. of Electr. and Radiolog.*, October, 1904) gives an account of a patient, afflicted with a large fibrosarcoma, deeply seated in the abdomen, which yielded in a remarkable way to the Roentgen rays. The case had been pronounced inoperable by competent surgeons, and erysipelas toxin had been used for ten months with only temporary success. After 46 applications during a period of 125 days the size of the tumor had increased appreciably but considerable improvement was noticed in the general condition. After this, the tumor began to diminish slowly in size and when the total number of applications had reached 136, it had disappeared entirely. The original dimensions of the spindle-cell sarcoma were: horizontal, 10 inches; vertical, 8 inches; anteroposterior, 5 inches.

A Case of Noma Cured by Means of Red Rays.—Another triumph of phototherapy is recorded in the successful treatment of that dread malady, cancrum iris, by W. O. Motshan (*Arch. f. Kinderheilk.*, Vol. 40, Nos. 4 to 6). The patient was a nine-year-old boy, who having passed successively through scarlatina, varicella and measles, developed noma of one cheek, which went on to perforation. Immediately upon the admission of the case to the hospital, the local use of red rays by means of a 16-candle-power incandescent lamp with a red globe, was resorted to. The wound alone was exposed to the rays. The results of this treatment were soon apparent. On the third day pain disappeared. Seven days later the anterior half of the wound was filled with granulations. The necrotic areas gradually diminished. Two months later the patient was presented before the Pedriatic Society of St. Petersburg, entirely cured.

Photo-Therapy.

Blue Light as an Anaesthetic.—Mr. H. Hilliard, anæsthetist at the London Hospital, has used blue light as an anæsthetic after M. Redard's method. He says: "Following M. Redard's plan, I have out of a total of thirty-two cases had twenty absolutely successful results, eight failures, and four cases in which the patients stated that they felt pain, and yet showed no sign of doing so beyond 'screwing up' their eyes during the operation. Most of the failures can, I think, be explained on the grounds that the patients were highly nervous, that they had while waiting their turn been told by others that some new experiment was being tried, and that they did not carry out my directions and keep their eyes fixed upon the light. The remainder may be explained, perhaps, by the fact that a different reflector was used, whereby the rays were not concentrated upon the patient's eyes, but were more widely diffused.

"In addition to the evidence advanced by M. Redard against the view that the influence of the light is hypnotic, I do not believe that so large a percentage of ordinary persons are so easily hypnotized, and I find that the results vary with the technique. I do not agree with M. Redard in the opinion that a general anæsthetic effect is produced, for I have found that

altho sensation in the extremities is temporarily impaired, yet there is no real analgesia, this apparently only existing over the area of distribution of the cranial nerves.

"In all the successful cases dilation of the pupils was observed, and in two or three the eyes became fixed and the lids drooped, the patient developing a somnolent condition; but in those instances in which the patient moves his eyes constantly and blinks the pupils will not dilate, and no analgesic effect should be expected.

"The last case in which the method was tried is unusually interesting The patient was a middle-age married woman who suffered from cardiac disease; she had been given gas on a previous occasion, and is said to have taken it badly. I therefore suggested blue-light rays, and the patient, although highly nervous, agreed. When, however, the light and veil, after two and a half minutes' application, were removed, and I told the operator to begin, she put up her hands to stop him, and said she could not bear it. I remonstrated with her, and she permitted the extraction of three teeth, putting up her hands again, as previously requested, when she had enough. She stated afterwards that she had felt no pain, but that she was more sensible of the last than of the first two extractions, and that therefore she was afraid it might hurt her if more teeth were removed. She said that she felt better on this occasion than she did after taking gas, and that she would come up again to have the operation completed if I would use the light rays next time" (*British Medical Journal*).

The Misuse of Hydro-therapeutic Measures.—Mistakes in the application of such measures are believed by Winternitz (*Berl. klin. Woch.*) to be the main reason why this branch of therapeutics has not been more favorably received by the medical profession. The necessary requirements he sums up as follows: (1) A careful analysis of any deviations from the normal in the organs or their functions, *i. e.*, a careful clinical history; (2) a knowledge of the physiological action of thermic and mechanical stimuli; and (3) a thoro knowledge of the technic of the procedures. In febrile diseases the choice of the temperature of the water is entirely dependent upon its action on the nerves, vessels and tissues, and it is a great mistake to use, at the beginning of the treatment, water at a very low temperature applied for a short time only and accompanied by only a slight amount of mechanical stimulation. Such baths should be merely cool, long continued and followed by sufficient mechanical stimulation. In cases of collapse and cardiac weakness, where there is a high body temperature and cold extremities, it is necessary to apply cold to the trunk, but the extremities must be warmed by rubbing with warm alcohol or the application of hot packs. In administering sitz baths, care must always be taken to guard against the loss of heat from the uncovered parts of the body. It is essential that each case be studied on its individual merits, and the writer believes that the art of acquiring this habit can only be gained from a well-managed hydro-therapeutic clinic.

Hydrotherapy in Hospitals.—According to Schaper, who has recently made a tour of Norway, Sweden and Denmark, all the larger hospitals of those countries are provided with a special pavilion equipped for the giving of all kinds of baths. The same may be said of many of the leading German hospitals.

A few of the hospitals in this country have introduced hydriatic measures, but in most of the leading hospi-

tals of the United States there is still a sad lack of appliances for the use of water and other physiologic measures. When visiting a large Eastern hospital recently, the editor made inquiry with reference to provision for the use of water, and was told that the leading physician was quite enthusiastic about hydrotherapy a few years ago, but his ardor had cooled off, and he had recently said nothing about it. In fact. the opinion was entertained that hydrotherapy was one of those passing fads which would soon be no more talked about than the sulphuretted hydrogen method of treating tuberculosis, or any other of the medical fancies which seem to take possession of a certain portion of the medical profession from time to time.

This is a great mistake. Hydrotherapy is here to stay. It is not a new thing; it is not a fad. It is as old as the earth, and though it has been greatly neglected, will gradually win its way to increasing recognition. Water is unquestionably the most powerful, the most versatile, the most universal of all therapeutic agents. To be sure, water itself is not curative. The same may be said of every other remedy. The remedy does not cure. The curative power resides wholly in the body. It is the blood that heals The same forces are required to heal the sick man as to maintain the well man in a state of health. The reparative forces of the body are identical with those forces which maintain growth and nutritive equilibrium. The curative powers of the body can be most readily stimulated into activity and modified as necessary by those natural aids to recovery which are classed under the general head of physiologic therapy.—*Good Health, Sept.,* 1905.

Hydrotherapy in Tuberculosis.

Of 1,000 tuberculous patients treated by hydrotherapeutic measures by D. Kuthy, (Blaetter fur Kline, Hydrother., 1904-, xiv, p. 93) in Budapest only 15 per cent. were discharged without any improvement, while from Belzig at Berlin, 42.5 per cent. were discharged thus; of his patients admitted in the first stage 53.9 per cent. were discharged clinically cured, of the Belzig patients only 39 per cent. There is but one difference in the treatment as carried out in the two institutions: at Belzig douches are the only hydrotherapeutic measures employed, at Budapest each individual receives any form of hydrotherapy deemed likely to prove beneficial. The patients well enough to be about are treated most frequently with the half bath; the patients who are kept in bed are treated by cold washing of the entire body in the morning and cold compresses to the trunk, changed every 2 to 3 hours. The duration of the half baths, 3 minutes, the temperature of the water at first is 89, and is gradually reduced to 82; while the patient is in the water he is well rubbed. The treatment improves the appetite, regulates the bowels, acts as a tonic, improves the sleep, betters the subjective state and is a mild hardening agent; with neurasthenics the water must not be below 85 degrees, otherwise they become irritable and restless. The bath is not used to reduce fever; patients with fever are better kept quietly in bed, nor would it be good to remove from them too large quantities of heat as their fever is due to a breaking down of tissues; the cold water increases cough, such patients are treated to much greater advantage with the cold water compresses. The entire trunk may be covered with a cold, wet bedsheet and this covered with a dry one and the patient thus placed in an evaporation bath. If adhered to for some time patients even in the third stage will have their fever reduced to normal and feel themselves much better; their appetite often improves remarkably. The cold wash of one part after the other every morning takes the place of the half bath above mentioned. Douches are used by him but little; they are altogether contraindicated in neurasthenics, where there is a tendency

to fever production, tendency to pulmonary hemorrhage and pleural pain. Foot baths and cold applications to the calves are good to reduce the temperature and induce sleep. Cold applications over the heart reduce cardiac irritability, just as warm applications over the stomach reduce gastric irritability.—*Therapeutical Review.*

The Morphology of Cancer and the Parasitic Theory.—In a long paper on this subject, J. Orth (*Berl. klin. Woch.*) discusses the various theories with regard to the parasitic theory of cancer, and sums up the objections to the same as follows: The essential factor in all cancers, primary as well as secondary, are the cancer cells, without which metastases cannot occur. In order to account for the formation of the latter, we need not assume the existence of parasites, for cancer cells which are capable of proliferating are all that is necessary. An analogy between cancer metastases and metastatic suppurations, tubercle formation or other infectious processes cannot be established, and the question of analogy cannot be made use of to account for the parasitic nature of cancer. The successful transplantation of cancer from one individual to another can be accounted for without having recourse to the parasitic theory, by assuming that this is a metastatic deposit of cells in another organism which forms the nidus of a new growth. None of the parasites which have thus far been described afford sufficient basis for a scientific theory, or, in other words, the parasitic theory as far as the cancerous growths are concerned is still in the air.

Uranium a Radioactive Parent.—Recent researches of Rutherford and Soddy appear to demonstrate that uranium is the parent, mediate or immediate, of radium. Polonium descends from radium in the seventh generation, the intermediate links being emanations and other unstable products. Polonium finally becomes either bismuth or lead, and then remains in that condition for a period beyond human computation. The transformation of radium into lead takes some 40,000 years. Our English contemporary, the *Electrician,* in commenting on this, says that we may take it that our gold standard is safe for that period at least, unless somebody succeeds in controlling the transmutation by artificial means. But no agency hitherto discovered seems to affect the process of disintegration to the smallest extent.—*Electrical World and Engineer.*

Telephones a Device of Satan.—The invention of the telephone has been ascribed and awarded by the courts to Bell. The old German Baptists say it is an invention of the devil, which seems different. A special dispatch from Indianapolis of June 14 says: "The National Conference of the Old German Baptists, which has been in session at Flora for the last four days, today adopted a resolution ordering all the members of the church to discontinue the use of the telephone.

Sunshine vs. X Rays.—Willard, of Philadelphia, in an article, "Sunshine vs. X Rays in Tuberculosis of the Joints and Bones," says: "Sunlight, fresh air and good food, together with fixation and protection of the affected joint, are the most important agents in the contest with tubercular infection. Direct exposure to the rays of the sun is essential, and all hospitals should be provided with solaria, or sun porches, and roof gardens. Patients lying in bed should have the diseased joints exposed to the direct rays of the sun, their head and eyes being protected by green

glasses or shades. The joints may be covered with blue, so as to secure easiest passage of the ultra-violet actinic rays, and local medication rich in iodin may also be employed as desired. Tent life on the hospital grounds, or better, in the open pine forest, can be successfully employed through both summer and winter. Sanatoria should be established for tuberculosis of the hard tissues, as well as of the soft.—*Brooklyn Med. Jour.*

Danger in X Ray Exposure.—A warning against the haphazard and indiscriminate use of the x ray by inexperienced operators seems particularly opportune at this time, as the lay press of San Francisco has so recently published the case of the unfortunate Mrs. Fleischman-Aschheim, whose arm was amputated a few weeks ago, for an epitheliomatous degeneration, caused by repeated exposure to these rays. Dr. P. M. Jones, the pioneer of this work on the Pacific coast, suffered from x ray burn of the hand as early as 1896; though 1900 he gave up this work entirely, even at present writing, trophic and degenerative changes are going on in that important member of his anatomy. Other men have been forced to give up the use of this valuable agent on account of burns, or, as in one case, on account of neurasthenic symptoms, such as have been early described by French authors. The literature germane to the subject describes the oblique action and dangers of the x ray most comprehensively. But it seems that the general rank and file of the profession have not had sufficient access to these publications or taken cognizance of them. The operator should be thoroughly protected by a lead screen. The use of the operator's hand to test the condition of the tube is extremely dangerous, and accounts for many burns. Fluoroscopic examinations expose the operator to the action of a quantity of the rays; hence, if frequently resorted to, it becomes a decidedly dangerous method. Changes in the skin of patients treated by the x ray take place, in many instances, even years after the exposure. These changes resemble closely the various scleroderma-like conditions of the skin. For this reason, trivial conditions of the face, hands, etc., should not be treated with the x ray, as the sequelæ may be more serious and disfiguring than the original trouble.—*California State Journal of Medicine.*

Radium and New Life.—A special cable dispatch of June 24 to the New York *Evening Post* says: "The greatest interest has been excited by the discovery of Prof. John B. Burke, of the Cavendish laboratory, which may be summarized thus: After years of negative experimentation on the phosphorescense of cyanogen, which Pfluger declared to contain the element of life, Mr. Burke resolved to test it with radium, and placed it in the test tube with sterilized bouillon. After a couple of days cultures were obtained of atoms which subdivide on reaching a certain size. Placed upon fresh portions of sterilized bouillon, these growths continue to grow slightly, thus showing that the influence of the radium is only initiatory. Prof. Sims Woodhead pronounced them neither bacteria nor crystals; but they present many appearances of vitality and seem to indicate the possibility of spontaneous generation. Mr. Burke contends that the experiment is not in the least destructive of the Deistic conception of the universe. 'In fact, if it can be shown that dust and earth can produce life, on account of their radio-activity, it would only confirm the truth of Biblical teaching.' Leading men of science maintain an attitude of reserve as to the vitality of Prof. Burke's radiobes."—*Elect. World and Engineer,* 1905.

The Curability of Cancer

A patient suffering from a rapidly developing sarcoma, involving the lower end of the radius and several metacarpal bones of the right forearm and wrist, was first seen by me nineteen months ago. The destruction of the bony parts involved, as demonstrated by a skiagram, was complete, the swollen area being covered with tense reddish blue skin, the whole, boggy and seemingly just ready to break down. An apparent fluctuation caused me to introduce an exploratory needle in search of pus, though I found none. Three doctors of this city, who announce that they devote their time exclusively to the teaching and practice of surgery made a diagnosis of osteo-sarcoma. Each set the limit of life at six weeks, unless an amputation of the forearm above the diseased part was performed at once; while two were so exercised at the seriousness of the condition, that the patient was urged to act at once, and under no circumstances to have the x ray used, particularly by the writer, being assured that to "putter" along with the x ray was criminal neglect Acting for the time upon the advice of one consultant, an hour was set for amputation, and the friends and relatives of the patient came from her country home to be near during the time of operation. Upon the day set, with unpardonable disrespect and disobedience, the patient sought my office, and upon my advice, exposed the growth to the much condemned x ray. The patient visited my consulting room today, March 15th, 1905, still possessed of a useful right arm. After five months of treatment following her first visit the patient left the city, and eight months later returned to show that an exudate thrown out where the boggy tissue was first seen, had hardened like the normal bone near by the involved part of the arm.

This statement I can make without hesitation, that no patient suffering from superficial cancer has been treated by me in the last two and one-half years, where there has been any recurrence even of the growth, nor have I seen a single case of cancer or sarcoma in any part of the body where the instructions given were followed with a reasonable measure of accuracy and diligence, that failed to be benefitted markedly. I have purposely refrained from making an earlier report, save a brief announcement a little over two years ago, because I believed two years should pass, with careful observation under the varied circumstances necessarily occuring, before anything should be said of results of treatment. — *Medical Herald* 1905.

Too Much of a Good Thing.—An old writer says: "When men lived in houses of reed, they had constitutions of oak; when they lived in houses of oak, they had constitutions of reeds." This is a very fine, picturesque description of the injury which may come to us from fine houses too closely sealed to keep out the fresh air, and too heavily curtained, preventing the entrance of sunshine, which is almost or quite as important as air. But it is not at all necessary to have our fine houses unhealthful, and it only requires intelligence and thoughtfulness to render a house of oak as promotent of health as a cabin. Fresh air will come into a well ventilated open house as well as thru the open cracks in a house of reeds, and sunlight thru a window in a palace as well as in a hovel.—*Health.*

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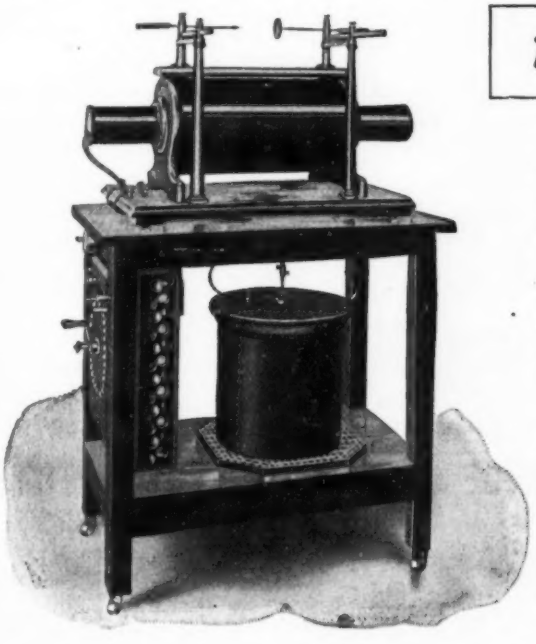

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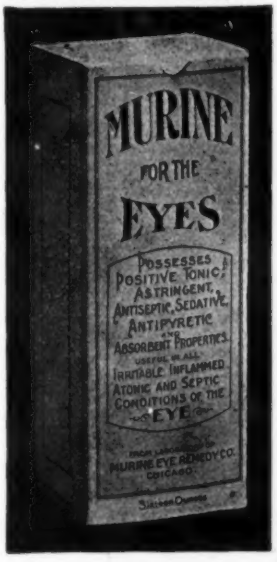
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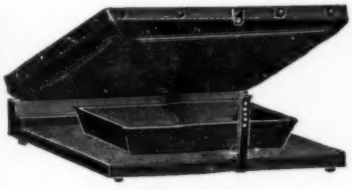

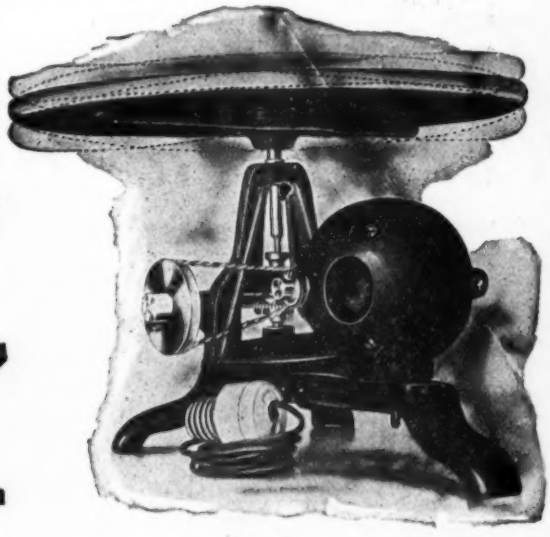

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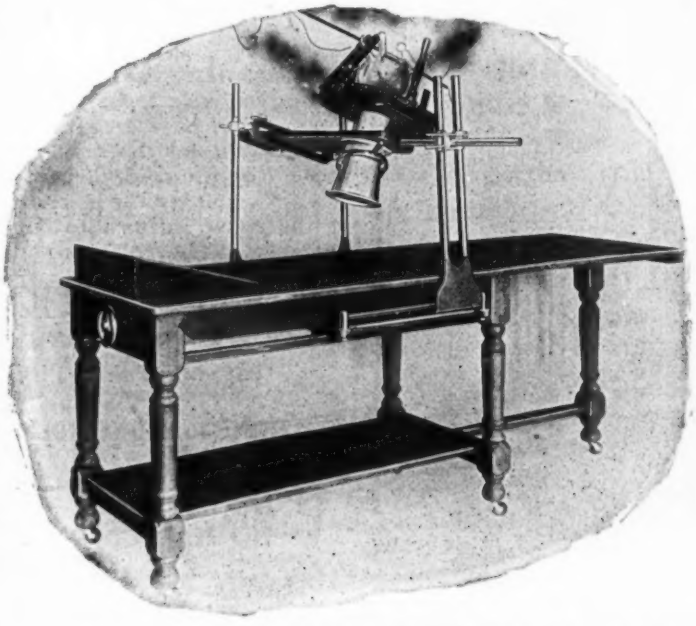

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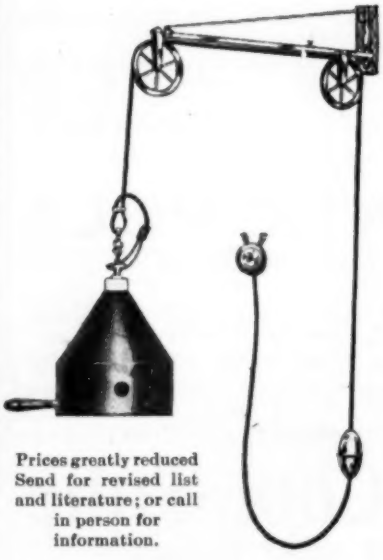

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depends, for its therapeutic value, upon
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The "LEUCODESCENT" is made in three intensities for Office and Hospital installation: 300, 400 and 500 c. p., each containing a single, specially prepared filament capable of carrying 7, 9, and 12 amperes; and is offered in a variety of styles and finishes.

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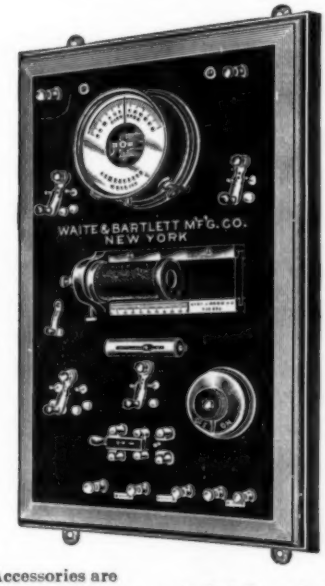

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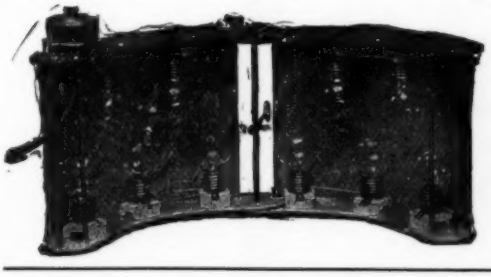

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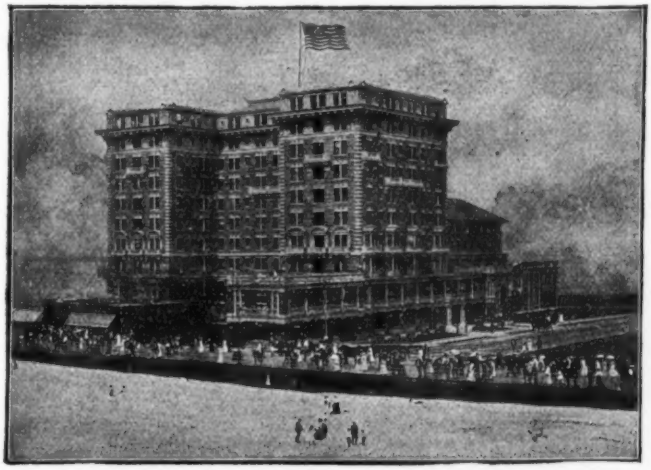

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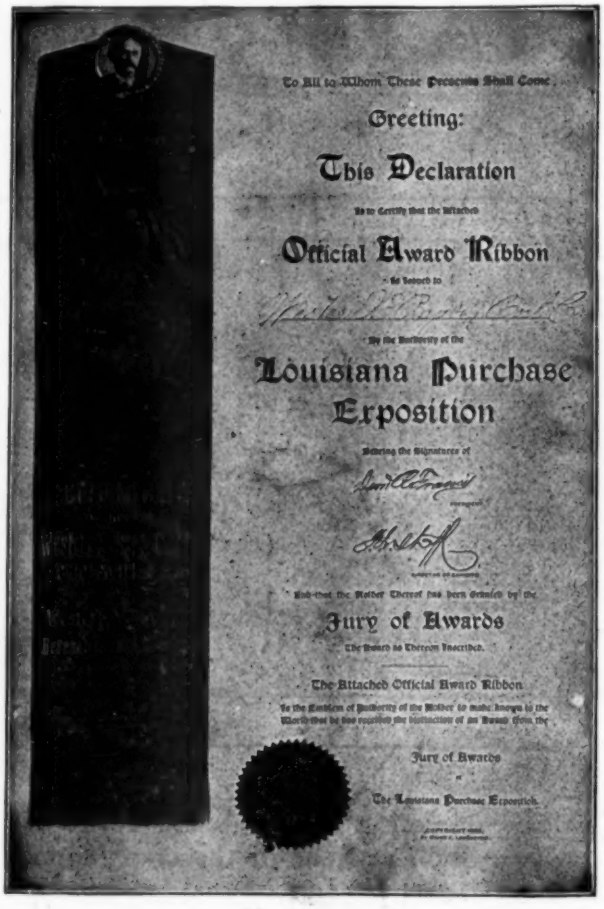

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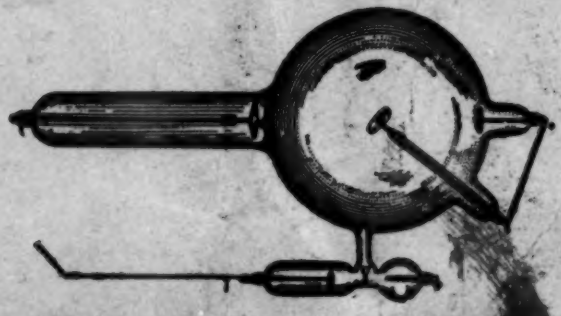

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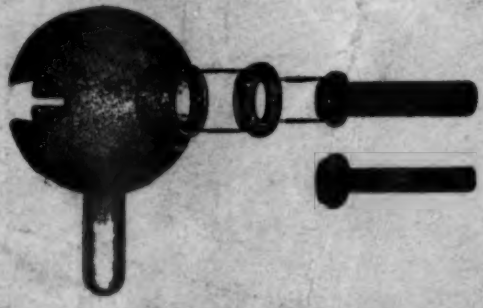

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